

KASETSART UNIVERSITY IN THAILAND:
AN ANALYSIS OF INSTITUTIONAL EVOLUTION
AND DEVELOPMENT IMPACT

A.I.D. PROJECT IMPACT EVALUATION REPORT NO. 69

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The views and interpretations expressed in this report are those of the authors and should not be attributed to the Agency for International Development

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Bibliography

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FOREWORD

The Center for Development Information and Evaluation (CDIE) is responsible for the agency for International Development's (~.I.D.) project impact and program policy evaluations. The goal of the evaluation program is to inform A.I.D.'s policymaking process and to improve project design, implementation, and evaluation. Through examinations of A.I.D. and of other donor and recipient country experience and the preparation of special syntheses, CDIE provides a better understanding of the characteristics of development programs and lessons of what works and does not work in various settings.

We believe that this review of Kasetsart University in Thailand provides valuable insights into the process of institutional development and the factors affecting the success of A.I.D.'s projects in support of institutional development. We encourage A.I.D. staff and others engaged in similar programs to draw on this report in their planning, implementation, and evaluation of institutional development programs.

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The assessment of any educational institution as old and complex as Kasetsart University or of a discontinuous relationship, such as that which has existed between the university and US~ID/Thailand, is not easily accomplished under the best of circumstances. Without the active cooperation of the university leadership and faculty members, an external evaluation team would have a very difficult time obtaining accurate data, rechecking and analyzing the information, and arriving at conclusions that are accurate, valid, and fair to all concerned agencies.

The cooperation received by the evaluation team from Kasetsart University leadership and faculty, officials of the Government of Thailand, representatives of international donor and research agencies, and members of the private sector was outstanding. During the time the team spent in Thailand, interviewees not only supplied team members with requested documents, opinions, and other information but often went out of their way to clarify points, raise issues, and suggest additional sources of valuable information.

In presenting this report, we would like to offer our sincere appreciation and thanks to several persons whose assistance in our effort was particularly significant and helpful.

University Rector Dr. Sutharm Areekul not only presented an excellent initial briefing for the team on the history, objectives, and operations of the university, but he also, despite his busy schedule, met with the team on several other occasions to supplement and clarify issues. Vice-Rector Dr. Sujin Jinahyon met with the team on the Kamphaengsaen campus, presented a full briefing on campus operations, and greatly facilitated our visit.

Without the assistance of the University Public Relations Officer Ms. M.L. Uemsook Kitiyakara in scheduling interviews, providing documents, and helping with many other matters related to this study, our work would have been virtually impossible in the limited time available to us.

And, finally, four senior faculty members, Drs. Phaitoon Ingkasuwan, Chamnien Boonma, Sopin Tongpan, and Charan Chantalakhana, provided team members with unique perspectives on the evolution of the university, spent many hours explaining particularly complex relationships, and generally contributed greatly to improving the team's understanding of the present university situation.

In closing, the team would like to absolve all of our informants in Thailand from any responsibility for the findings, opinions, and statements presented in this report. The team

alone bears responsibility in these matters. To the extent that factual errors remain in our presentation, we ask the understanding of all those persons affected by such errors.

SUMMARY

Kasetsart University, a public university, has been in existence since 1943. It is composed of 11 colleges, 1 graduate school, and 5 units with faculty rank. The university has more than 13,000 students, with approximately 2,300 candidates at the graduate level. The academic faculty has 1,370 members, of whom 340 hold doctorates and 787 masters' degrees.

The original role of the university was to provide welltrained agricultural manpower for the Ministry of Agriculture and Cooperatives and other agricultural development agencies of the Government of Thailand. To date, 38,270 students have graduated from the university. Having substantially achieved its Government manpower training objective by the mid-1970s, Kasetsart University has now entered a new phase. The university is developing a more generalized set of course offerings and is no longer viewed by its faculty or other Thai as a predominantly agricultural university. It is striving to find its place in a local economy that is increasingly demanding specialist expertise, oriented to international trade and competition, and driven by private sector enterprise.

In assessing the direct impacts of Kasetsart University on the agricultural sector and rural development in Thailand, the evaluation team selected 10 accomplishments for special attention. One outstanding impact has been through the work of the National Corn and Sorghum Research Program, a cooperative program involving the university, the Ministry of Agriculture and Cooperatives, and the Rockefeller Foundation. This program has been instrumental in providing Thai farmers with improved maize varieties and crop-culture practices, which have resulted in a hundredfold increase in maize production within two decades. Currently, these maize composite and hybrid varieties are planted on about 66 percent of total maize acreage in Thailand.

In addition, the university has influenced the development of a domestic tropical fruit industry that is acknowledged to be the leader in Southeast Asia--and possibly the world. Kasetsart faculty have also made significant contributions to the development of local specialty crops, including honey, straw mushrooms, tropical orchids, and the world-famous Thai silk.

Animal scientists, fishery specialists, and food product development experts at the university have all contributed to supplying the Thai people with high-quality, low-cost protein supplements for their diets. The poultry and swine industries have been modernized in collaboration with the private sector. A local dairy industry is being developed in response to rising consumer affluence, particularly in the larger cities. And, Thailand is a

regional leader in the development of innovative processed foods and aquaculture products.

In the past decade, specialists in Thailand have become increasingly concerned with problems of environmental degradation and natural resource management. Kasetsart professors have been contributing to the analysis of these pressing problems through their work in soil mapping, land-use classification, and remote-sensing applications.

The major indirect impact of Kasetsart University has been through its thousands of graduates now employed in Government agricultural agencies, in the three new regional agricultural universities, and, increasingly, in private sector firms. The evaluation report presents several interesting examples of the impacts of Kasetsart graduates on the Thai economy.

The evaluation team identified the positive factors that have affected the evolution of the university and its ability to contribute to agricultural development. The team also identified certain issue areas related to university administration and the perception of the university's role. These are presented as issues for consideration both because the team believed they relate to the university's ability to fulfill its outstanding potential and because these constraints appear to be sufficiently common to be pertinent to any comprehensive analysis of developing universities worldwide.

The following key lessons were derived from the evaluation team's assessment of Kasetsart University's institutional development and its contribution to agricultural development in Thailand:

1. A fundamental reconceptualization of the concept and role of agricultural higher education is needed for enhancing the impact and relevance of agricultural universities and facilities.
2. There is a need for strategic planning mechanisms within universities to integrate diverse faculties and disciplines around a common set of education and research priorities.
3. New modes of university organization and structure are needed to allow faculty and students to engage in more problem-solving modes of active learning.
4. The needs for university autonomy and accountability should coexist in a dynamic tension in order to ensure that university programs are responsive to a changing environment.

5. Strong institutional incentives are needed to support the emergence of visionary and entrepreneurial leaders who can introduce change and innovation within the
6. The constant replenishment and nurturing of university faculty and administrators will need to be more effectively addressed by host governments and by external donor agencies in order to sustain education and research effectiveness.
7. External donors need to focus more attention on developing and institutionalizing external linkages between universities and the various policy, scientific, and industrial constituencies they are designed to serve.

GLOSSARY

A.I.D.	-	Agency for International Development
ACNARP	-	Australian Cooperation National Agricultural Research Project
ASEAN	-	Association of Southeast Asian Nations
AVRDC	-	Asian Vegetable Research and Development Center
CIAT	-	International Center for Tropical Agriculture (Centro Internacional de Agricultura Tropical)
CIMMYT	-	International Center for the Improvement of Maize and Wheat (Centro Internacional de Mejoramiento de Maiz y Trigo)
CIP	-	International Potato Center (Centro Internacional de Papa)
IBRD	-	International Bank for reconstruction and Development (World Bank)
IFRDP	-	Institute for Food Research and Product development
IPPC	-	International Plant Protection Center
IRRI	-	International Rice Research Institute
MSA	-	Mutual Security Agency, a predecessor to A.I.D.
NBCRC	-	National Biological Control Research Center
NRCT	-	National Research Council of Thailand

1. PROJECT SETTING

Kasetsart University was founded on February 2, 1943 by act of the Parliament of the Kingdom of Thailand. It was chartered as the first agricultural university in Thailand offering a 3-year nondegree curriculum under the Ministry of Agriculture. The university was organized by amalgamation of the preexisting Colleges of Agriculture and Forestry of the Ministry of Agriculture and the addition of two new faculties: the Faculty of Cooperative Science (now the Faculty of Economics and Business Administration) and the Faculty of Fisheries.

Subsequent legislation in 1955 allowed the inclusion of two other faculties, namely, the Faculty of Veterinary Medicine from the University of Medical Sciences (now Mahidol University) and the Faculty of Engineering from the Royal Irrigation Department of the Ministry of Agriculture. In 1966, the Faculty of Science and Arts and the Graduate School, a coordinating unit for the graduate studies program, were established. Finally, in 1969, 1974, and 1980, the Faculties of Education, Social Sciences, and Agro-Industry, respectively, came into existence. In 1981, the existing Faculty of Science and Arts was split into the Faculty of Science and the Faculty of Humanities. Thus, at present, 12 faculties (including the Graduate School)--or colleges in U.S. terminology--constitute Kasetsart University.

The university's main campus is located in Bangkhen, a suburb of Bangkok, Thailand's capital city. The main campus site is shared with a number of departments and institutes of the Ministry of Agriculture and Cooperatives; the university has approximately 125 hectares of land for its exclusive use. A satellite campus in Kamphaengsaen District of Nakhon Province was established in the 1970s with development assistance from the World Bank. This second campus is approximately 10 times the size of the main campus (1,250 hectares) and is located in a predominantly rural area, which is about a 1 1/2-hour drive from Bangkok.

Kasetsart University was the first university in Thailand to offer degree programs in agricultural sciences. These degree offerings were initially developed in response to the large Government demand for well-trained staff for the various units of the Ministry of Agriculture and Cooperatives. Over the intervening period, the need for degree holders in fields other than agriculture and related sciences led to the university's development into a full-fledged general university. In addition to the 12 faculties, there are five units with faculty rank: the Institute of Food Research and Product Development, the Office of Extension and Training, the Office of the University Library, the Research and Development Institute, and the Office of University Computers (see Figure B-2 in Appendix B).

Kasetsart University recognizes the need to play a leading role in manpower training in agriculture and rural development. Thus, with assistance from such institutions as the Rockefeller

Foundation, the University of California, Oregon State University, the University of Hawaii, and Cornell University, Kasetsart conducted several feasibility studies on university development and expansion.

One compelling factor that has driven university expansion has been the rapid increase in graduates from Thailand's secondary school system over the last three decades. As a result of this increase, enrollment at Kasetsart University in 1970 had already surpassed the projected 1980 target of 5,800 students. Enrollment in the 1987-1988 academic year stands at about 11,000 undergraduates, 2,236 master's degree candidates, and 55 Ph.D. degree candidates. These students are pursuing studies in 54 bachelor's degree programs, 52 master's degree programs, 5 Ph.D. degree programs, and 1 doctor of veterinary medicine program.

Given the rapid increase in student enrollment that had already occurred by 1970, it was thought that Kasetsart's main campus at Bangkhen had reached its maximum student capacity. Thus, the university adopted a massive expansion project at the Kamphaengsaen site, with the authorization of the Government and financial assistance from the World Bank. The expansion project was intended to establish a strong teaching and research program and provide needed facilities in agricultural sciences. The project was officially started in May 1972 and completed in July 1980. Excellent additional research and extension facilities were also provided through a grant-aid program with the Government of Japan. (There are now approximately 1,500 students in residence on this campus.)

Total enrollment at the Kamphaengsaen site is projected to reach 12,000 students. The Bangkhen campus is now serving some 12,000 graduate and undergraduate students. It is anticipated that the Bangkhen facilities, in addition to supporting the Kamphaengsaen development, will serve the new university requirement to expand and strengthen services in the fields of business, education, industry, and health.

2. PROJECT DESCRIPTION

Long-term project assistance to Kasetsart University from the Mutual Security Agency and its successor agencies, including the International Cooperation Agency and the Agency for International Development (~.I.D.), started in 1951 and continued through 1965. During this period, U.S. aid agencies provided direct assistance to Kasetsart University, and two U.S. universities--Oregon State University and the University of Hawaii--were contracted to provide additional assistance in institutional development to the university.

2.1 Direct U.S. Assistance Agency Support

In 1951, Kasetsart University accepted technical assistance from the Mutual Security Agency to facilitate institutional development. Two officials of the Agency worked with university staff in an advisory capacity for 1 year, focusing on training in agricultural education.

2.2 Oregon State University Assistance

Between 1952 and 1954, Professors E.L. Potter and J.R. Beck from Oregon State University worked with Kasetsart University Rector Luang Suwan, other faculty members, and U.S. aid program officials to assess the university's need for the improvement of resident instruction and the development of the physical facility of the Bangkhen campus. At that time, it was felt that "the final value of Kasetsart University must be measured by its usefulness to Thailand and not measured by its conformity or nonconformity to standards of foreign institutions" (Potter 1952). The Oregon State assistance program was to center on improving faculty capacities in university development planning and in undergraduate teaching. These activities were selected to assist the university in fulfilling its mandate "to develop well-qualified young people to serve as government officials who would become real leaders in agricultural field work and in agricultural research" (Potter 1952). Specifically, Oregon State College--later University--was to provide an administrator to assist in developing plans for the growth and expansion of the young university and to recommend U.S. professors to fill some positions in order to assist their Thai counterparts in designated disciplines.

The first International Cooperation Agency-funded contract between Kasetsart University and Oregon State College was for a 30-month period, beginning in October 1954. Sixty-three percent of the initial funding was earmarked for improvements to the campus physical plant and the remainder for provision of technical assistance, staff participant training, and support to activities in teaching, research, and extension. Oregon State College was to work with Kasetsart University in "conducting projects and activities in some or all of the departments of the university to strengthen educational and research programs and, where applicable, extension programs." These broad objectives were to be accomplished through the following:

- Improvement of teaching methods, content of courses, and curricula
- Assistance in the development and conduct of research, extension, and demonstration projects
- Development of laboratory and classroom facilities
- Construction and use of teaching aids

- Improvement of libraries
- Selection, procurement, and use of books, laboratory apparatus, other equipment, and supplies
- Strengthening the faculty by assistance in the selection of up to 60 Kasetsart University faculty members and graduate students for advanced training and education in the United States

Over the life of this contract, Oregon State College provided resident team of six professors in the following disciplines: geology, chemistry, physics, plant pathology, agricultural economics, and agricultural engineering. The group served on the Bangkhen campus for 22 months with the mandate to strengthen teaching in basic sciences. Oregon State also provided a short-term consultant in home economics to the newly instituted Department of Home Economics in the Faculty of Agriculture. In addition, the contract provided for the training of 12 Kasetsart junior staff members at Oregon State College to further their graduate studies. Finally, through the program, books and laboratory equipment were purchased for the university.

Between April 1957 and September 1960, Oregon State College's assistance program to Kasetsart University was funded through a series of contract extensions. During the first part of this period, Oregon State College provided a second group of professors in chemistry, plant pathology, forestry, business administration, and home economics to work with their colleagues in developing instructional materials, facilities, and functional education in the Colleges of Forestry and Cooperative Science and in the newly established Department of Home Economics.

Subsequently, activities were undertaken to strengthen research work in agriculture and related fields. Three additional advisers were sent to Kasetsart University, one experienced in research and teaching methodology and two in soil fertility and field-crops research.

By 1960, 59 Kasetsart staff had participated in U.S. graduate training programs. A considerable amount of office, laboratory, and other research equipment had also been made available to the university.

2.3 Renewed Direct U.S. Assistance Agency Support

From the end of the Oregon State University contract in 1960 through 1962, U.S. support of Kasetsart University continued through direct U.S. assistance agency support of applied agricultural research.

2.4 University of Hawaii Assistance

In mid-1961, A.I.D. invited a survey team from the University of Hawaii "to explore the need of Kasetsart University for further assistance of the type that might best be provided through the medium of a university contract" (Kasetsart/Hawaii University Contract 1965). At the conclusion of this mission, the survey team suggested resumption of a university contract program but with primary emphasis on the development of Kasetsart's research capability. Improvement of the teaching program, upgrading of the faculty, and additions to the university's physical plant would receive important but secondary attention.

As a result of this assessment, a contract was established with the University of Hawaii to provide technical assistance to Kasetsart University. Under this program, which lasted from May 1962 through August 1965, the University of Hawaii provided a resident team of eight advisers, seven short-term specialists, and two administrative aides. Assistance was provided in the fields of horticulture, dairy husbandry, fisheries, agronomy and soils, entomology, watershed management, English, agribusiness, home economics, veterinary science, poultry science, arts and sciences, and graduate program administration.

3. DIRECT INDICATORS OF KASETSART UNIVERSITY'S IMPACT ON THE AGRICULTURAL SECTOR IN THAILAND

Kasetsart University is a large, complex institution that has been in existence for 45 years. Because the impacts of this multifaceted university on the rural sector in Thailand are too numerous to assess comprehensively in this report, only selected impacts are examined here. The evaluation team, in reviewing the impacts of Kasetsart University on the development of the agricultural sector in Thailand, selected for discussion in this report some salient examples of outstanding direct contributions to agricultural development made by individual Kasetsart faculty members--or groups of faculty. Section 4 addresses some indirect impacts of Kasetsart University through its graduates who are working in the public and private sectors.

3.1 Development of Improved Maize Varieties in Thailand

Annual maize production in Thailand has risen from 50,000 tons two decades ago to approximately 5 million tons in recent years. Various entities associated with Kasetsart University, both Thai and foreign, have had a direct role in this dramatic increase. The National Corn and Sorghum Research Program was organized in 1966 as a cooperative effort involving Kasetsart University, the Ministry of Agriculture and Cooperatives, and the Rockefeller Foundation. In 1983, the International Center for the Improvement of Maize and Wheat (CIMMYT) began work with Kasetsart University and replaced the Rockefeller Foundation in this effort. The university's Suwan

Farm, an excellent 160-hectare research facility, was developed primarily for maize research.

Several composite and hybrid maize varieties, including Suwan 1, Suwan 2, and Suwan 3, were developed through these cooperative research programs and released through the university facility. The Suwan maize composites have resistance to the fungus Peronosclerospora sorghi. This organism causes downy mildew in maize and was a major factor limiting crop production in Thailand until resistant varieties were developed through the cooperative plant breeding program. These composite varieties, which became available to farmers in 1975, are currently planted on approximately 55 percent of the total maize production area in Thailand; an additional 11 percent of the hectareage is planted with hybrid maize varieties.

3.2 Propagation Techniques and Cultural Practices for Fruit Crops

Thailand is highly advanced in the production and culture of many tropical and temperate fruits. In 1985, fruit exports totaled \$30 million, which constituted only 2 percent of the total value of fruit production in the country (Subhadrabandhu 1986). By training personnel for employment in both the public and private sectors, the Department of Horticulture of the Faculty of Agriculture at Kasetsart University has contributed significantly to Thailand's success in fruit production and marketing. This department has also been instrumental in introducing new germplasm and superior rootstocks into Thailand.

Improved techniques for grafting, budding, culture, and propagation of fruit crops have been tested and disseminated. In addition, tissue culture, which is used for genetic preservation of outstanding cultivars, rapid propagation, and mutation breeding, has been introduced and used by Kasetsart University for several fruit crops. Workshops to train extension officers, farmers, and other private sector personnel have led to the wide dissemination of these techniques.

Another important contribution of the department has been in cooperation with the Royal Forestry Department in the highlands of northern Thailand, which is home to 700,000 hilltribe people. Beginning in 1969, as part of the King's Hilltribe project, research has been conducted to determine which fruit crops are most productive under highland conditions. Fruit trees fit well into the agroforestry systems that seem most appropriate for this region. At present, some varieties of peaches, Japanese apricots, pears, apples, and persimmons have been adopted by the hilltribe people (Subhadrabandhu 1984). Research to determine other appropriate fruit crops is continuing.

3.3 Disease Control in Durian

Durian is one of the most highly prized tropical fruits in Thailand, with an annual production of about 139,000 tons. In recent decades, a root and stem rot caused by the fungus Phytophthora palmivora devastated many durian plantings. Personnel from the Department of Agriculture, who were working on their M.S. thesis in the Department of Plant Pathology at Kasetsart University, identified resistant rootstocks of durian among wild trees in Thailand. The Department of Plant Pathology also introduced the use of the systemic fungicide ridomil. These two measures have controlled the disease and essentially saved the durian industry.

3.4 Development of Beekeeping and Silkworm Production

Silkworm culture is an ancient art in Asia and has been practiced in Thailand for centuries. Most silkworms are raised on small farms that have only 1/6 to 1/3 of a hectare of mulberry trees. The Department of Entomology has been instrumental in improving silkworm production by studying the genetics of the silkworms and through controlled matings. Improvements in yield and quality of silk produced are striking and are making silkworm culture more profitable for Thai small farmers.

The department has also produced trained graduates for both the public and private sectors. Integrated pest management techniques have been introduced and are now used in Thai agriculture. Beekeeping also has been introduced as a profit-making enterprise for small farmers, including some of the hill tribes in the north.

3.5 Higher Productivity in Straw Mushroom Culture

Straw mushrooms are edible mushrooms grown on rice straw in warm tropical countries. The Department of Agriculture of the Ministry of Agriculture and Cooperatives and personnel from several departments at Kasetsart University have been instrumental in developing and extending straw mushroom production technology throughout the country. They showed how production could be industrialized, producing inoculum or "spawn" of the fungi, and organized training workshops to extend knowledge on straw mushroom culture to farmers and Government officials. Straw mushroom culture has now become an important industry and a supplementary enterprise for many farmers.

3.6 Innovation Through the National Biological Control Research Center

The National Biological Control Research Center (NBCRC) was established in 1975 and is a joint cooperative venture of Kasetsart University, various other academic institutions, and Government agencies involved in biological control and integrated pest management in Thailand. NBCRC has released a wide variety of insect predators and parasites, which are having a significant impact on

the control of destructive insects, snails, and other pests attacking various agricultural crops. Similar interventions have also been made to control several noxious agricultural and water weeds and harmful insects that affect livestock and humans.

Because of the almost total dependence on agrochemicals for pest control in Thailand, the work of NBCRC in finding low-cost biological alternatives promises to be extremely important in lowering pest control costs and lessening the adverse environmental effects of chemical buildup and misuse in the future.

3.7 Work in Soil Mapping and Land-Use Classification

The patterns of land use in Thailand are both extremely complicated and a source of increasing concern. A recent natural resource profile of the country (Arbhabhira 1987) shows a deteriorating resource base in Thailand due to land exploitation and resource abuse. As part of a Government of Thailand program to arrest--and ultimately reverse--this pattern of misuse, a comprehensive, national scheme for land-use classification has been developed. All land in the country is to be classified in one of five categories: conservation area, productive forest, agroforestry area, upland rainfed farming area, and lowland paddy rice area.

Essential to any such classification system is a sound analysis of the soils in all regions of the country and the appropriateness of the soils for different types of crop production. The Departments of Agriculture and Soil Science of Kasetsart University have produced a series of soil classification maps for Thailand that are being used in this Government effort. In addition, a number of university staff are participating in various efforts throughout the country to measure the destructive effects of misuse of land resources (e.g., changes in water hydrology, erosion rates under different soil and slope conditions) and proposing methods of combating such practices.

3.8 Adaptation of Remote-Sensing Applications to Natural Resource Management

Kasetsart University geography professor Dr. Tasanee Anaman of the Faculty of Social Sciences has played a major role in the development of a national capacity to use remote-sensing technology and methods in analyzing changes in the patterns of land use and shifts in population. This work has been used to determine policies and programs to support land resettlement, to identify appropriate crops for particular geographic zones, and even to assist in urban planning in the Bangkok metropolis.

What started 15 years ago as a personal effort to use aerial maps to teach geography to Kasetsart students has developed into a national role for Professor Tasanee as Vice-Chairperson of the National Geographic Association and member of the National Geog-

raphy Committee of the National Research Council of Thailand. Dr. Tasanee's work has facilitated the development of highland agriculture in the Western Region by identifying, in cooperation with the Department of Horticulture, suitable crops for a new settlement area that was opened up to resettle 1,500 families from five villages that were inundated as a result of the construction of the Khao Lam Dam on the Khwae Noi River. Professor Tasanee has also been instrumental in developing an integrated land and watershed management information system for the country.

3.9 Development of High-Protein Food Supplements

The Institute of Food Research and Product Development (IFRPD) is a Kasetsart University unit with faculty rank. IFRPD is chaired by an M.S. graduate from California Polytechnic Institute trained under an A.I.D. participant training grant. This institute is an outstanding example of a university unit that has made a significant impact through research and the application of new technologies to age-old problems. IFRPD has been very successful in designing and producing a variety of food products that are acceptable in the marketplace and inexpensive enough to be used in food assistance programs. Included in the array of products are "Kaset Protein" for infant and child feeding, synthetic meat products from vegetables and grains, and dried fruit and vegetable products.

The IFRPD director has also established excellent functional relationships with the Faculties of Agro-Industry and Engineering in the design of equipment for commercial food processing and the development of prototypes for experimental processing and use in small-scale village food-preparation operations. Such equipment includes small-scale extruders for production of food concentrates, commercial and small-scale food processors/driers, smallscale wine-making equipment, and experimental techniques for algae processing.

IFRPD conducts seminars in food processing and use for housewives and students at the campus facilities and, with the cooperation of the extension services in rural areas throughout Thailand, has developed mobile units to demonstrate similar techniques. Through A.I.D. and other donors, the director has managed to obtain prototype equipment and machinery in addition to that designed and constructed by IFRPD with the cooperation of the Faculty of Engineering.

One of the most recent achievements of this progressive and dynamic institute was the organization of an Association of Southeast Asian Nations (ASEAN) Food Conference in collaboration with the Food Science and Technology Association of Thailand; the Ministry of Science, Technology, and Energy; and the Federation of Institutes of Food Science and Technology in ASEAN. Through conferences like this, the institute is having impacts not only in

Thailand but throughout southeast Asia.

3.10 Development of Agriculture Techniques and Introduction of New Fish Species

Freshwater fish have served as a major source of protein in the Thai diet for many centuries. Fish has been a cheap and plentiful protein source, but its availability from natural sources has declined with rising population, dam encroachment of fishery resources, and the increasing pollution of Thailand's surface waters. Natural fish production, therefore, is now supplemented by aquaculture.

Kasetsart University contributed to the early work on aquaculture techniques by introducing and testing several new fish species and working on least-cost fish-feeding rations. Among the species tested were several catfish, the Chinese grass carp, the rice carp, the snake-skinned gourami, the milk fish, and tilapia. The introduction of the catfish species was of particular interest because these fish can be fed chicken and hog manures. This effort allowed the effective integration of aquaculture operations with poultry and swine enterprises, offering an efficient system for recycling nutrients. The walking catfish, the gourami, and the black tilapia (*T. nilotica*) later became the most popular aquaculture fish and turned many marginal rice producers into wealthy fish farmers.

Another commendable effort during the late 1950s was to supply the budding agriculture industry with secure sources of fish fry and fingerlings. This started with the adaptation of old artificial-breeding techniques for aquarium fish for use in the mass production of commercial fish species. The artificial breeding techniques were later improved by the use of hormone injections and made applicable to various commercial species. These techniques opened up greater prospects for commercial aquaculture and also provided the means for restocking bodies of water decimated of their natural fish stocks.

4. INDIRECT INDICATORS OF KASETSART UNIVERSITY'S IMPACT ON THE AGRICULTURAL SECTOR IN THAILAND

4.1 Impacts Through Kasetsart Graduates in the Public Sector

The biggest single cumulative impact of Kasetsart University on the rural economy of Thailand has been through its undergraduate and graduate students over the last 45 years. As of academic year 1986/1987, Kasetsart University had produced a total of 38,270 graduates. These graduates have now risen to important staff and leadership positions in virtually every agency of the Government of Thailand concerned with agriculture and rural development. Although Kasetsart University itself has had a rather modest direct role in agricultural research, a very large percentage of researchers

engaged in public agricultural research activities in the country were trained at Kasetsart University at either the undergraduate or graduate level.

In addition, up to 85 percent of the staff at each of the newer regional agricultural universities in Thailand--Khon Kaen, Chiang Mai, and Prince of Songkla Universities--are professors and lecturers who received their undergraduate training at Kasetsart University before moving on to international participant training programs at the M.S. and Ph.D. levels.

4.2 Impacts Through Kasetsart Graduates in the Private Sector

Particularly in the past two decades, increasing numbers of Kasetsart graduates have gained employment with private sector companies. These companies have spearheaded the growth of Thai exports for a whole gamut of agricultural products and introduced vertically integrated systems for crop and livestock production in Thailand.

4.2.1 Development of the Orchid Industry

Although Thailand has a rich natural endowment of native orchid species, the commercial production of orchids for domestic use and export is a relatively new industry. According to information provided by commercial orchid growers, the origin of the commercial industry lies in the pioneering work of Dr. Rapee Sagarik of Kasetsart University, who first introduced orchid tissue-culture techniques to Thailand about 20 years ago after a tour of horticulture laboratories in the United States.

Since that time, Dr. Rapee and his colleagues, including Dr. Chittrapan Piruk, have trained many Kasetsart students in the seed propagation and tissue culture techniques that are essential for modern commercial orchid production. Dr. Rapee and his colleagues have also been instrumental in assisting private companies to install proper laboratories. This work has been so effective that most of the current managers and scientific staff members of leading orchid producers are Kasetsart graduates.

In addition to having received their essential training from Kasetsart University, many of these graduates maintain close relationships with Kasetsart faculty members and obtain valuable assistance from them in solving industry problems. One interesting example of such cooperation was in the solution of the serious insect-predation problem of orchid buds.

In the recent past, orchid growers were plagued with a mysterious problem of bud drop in their blooming orchids. Since the loss of even one flower on a stem of orchids disqualifies it as an exportable product, the problem was potentially devastating financially for producers. Mrs. Kulchawee Kamjaipai, an M.S. degree

graduate from Kasetsart and an employee of the Bangkok Flower Center, decided to confer with Dr. Varuree Rojanawong, one of her professors at the university, to see if together they could discover the cause and find a solution to the problem.

After 3 years of collaborative work, the two researchers discovered that the problem was caused by an extremely small, night-flying fly that laid its eggs on the orchid buds. The resulting larval worm destroyed vital tissues in the orchid bud, exposing it to secondary infections that caused the bud to drop. An appropriate spraying regime solved the problem and prevented serious losses in a multimillion dollar export industry.

4.2.2 Introduction of Modern Poultry Technologies and Breeding

The modern poultry industry in Thailand accounts for a large share of the country's livestock product exports. The industry, which uses modern, high-output plants to raise and process broilers and ducks and supplies the domestic market with eggs and poultry products, has evolved parallel to the domestic feed grain industry. It is patterned on similar vertically integrated operations in the United States, but it also involves contractual arrangements with farmers who combine broiler and duck enterprises with aquaculture.

In the 1950s, Dr. Luang Suwan, then Rector of Kasetsart University, obtained a loan to set up and operate a university poultry farm that served as a demonstration center for prospective commercial poultry farmers and promoted greater use of eggs and poultry products by Thai consumers. This farm was one of the first examples of an integrated poultry operation in Thailand, with enterprises for poultry breeding and chick multiplication, several units for caged production, a feed mill, a processing unit, and a salesroom. The center also pioneered systems for integrating chicken and duck enterprises with new aquaculture techniques. Finally, the university disseminated these new techniques and promoted the benefits of egg and poultry consumption to the public through a regular series of radio broadcasts, news releases, and poultry-raising contests. These tactics, plus convincing demonstrations that poultry enterprises could generate good income, succeeded in expanding the market and creating a group of specialized poultry farmers within a decade.

More recently, the Department of Animal Sciences, in addition to supplying the intensive poultry industry with managerial and operational services, has also stimulated improvements in village poultry development through participation in extension service programs for crossbreeding high-quality parent stock with native chickens.

Kasetsart University's indirect impact on poultry development will continue because the growing industry depends on welltrained graduates for managerial and operational positions within the

private sector.

4.2.3 Development of the Early-Ripening Tomato Industry

The contribution of the noted Kasetsart plant breeder Dr. Bancherd to the development of early-ripening varieties of tomatoes is well recognized in Thailand. Today, a high percentage of the tomatoes in Bangkok's markets come from the Sri Chiangmai area of Nongkhai Province in the northeast. Dr. Bancherd and Dr. Thaworn, an agronomist from Khon Kaen University, are highly acclaimed for their work with private producers and for the emergence of this area along the Mekong River as a major vegetable production center.

4.2.4 Development of the Dairy Industry and Establishment of the International Buffalo Information Center

The Department of Animal Science of Kasetsart University (and at other universities) has maintained programs in undergraduate and graduate training in animal science and dairy processing, with graduates often benefiting from international participant training programs. In addition, other donors, such as the Rockefeller Foundation, have contributed staff and advanced educational support in animal science and research development.

Kasetsart University maintains a dairy unit at the Kamphaengsaen campus to provide practical training in dairy technology and dairy-cow nutrition. Although this unit is not involved in research itself, it has stimulated the conduct of research studies within the dairy industry. These investigations have generally addressed improved breeding programs and nutrition.

Kasetsart University has also established an International Buffalo Information Center with the assistance of the International Development Research Center. The International Buffalo Information Center, which is located in the Kasetsart University library, collects research information from worldwide sources and also publishes research papers. The center has conducted seminars on the water buffalo and published proceedings. The center has also contributed significant research in buffalo cross-breeding, reproductive physiology, and nutrition, which has had a measurable impact in increasing milk production in rural areas, improving the quality of water buffalo meat, and improving the efficiency of the water buffalo as a draft animal.

4.3 The University as a Base for and Facilitator of Cooperative Efforts With International Research Organizations and Foreign Donor Agencies

Another indirect impact of Kasetsart University is its role as a base for many international research organizations and foreign donor agencies. Representatives of these organizations stated in interviews that they generally found Kasetsart University to be an

excellent and hospitable host for their operations, even when their activities were predominantly regional. The university is an ideal base for external agencies because of such factors as the university's close proximity to air and ground transportation; its excellent physical facilities, including world-class laboratories; and the access it affords to professors who are experts in their field and who have broad contacts within the Thai and Asian agriculture communities.

The following are some examples of the results of cooperation between Kasetsart University and international organizations:

1. Development of improved maize, sorghum, and wheat in cooperation with the International Center for the Improvement of Maize and Wheat (CIMMYT) and the Rockefeller Foundation.
2. Biological techniques for controlling agricultural pests in cooperation with the International Plant Protection Center (IPPC), the Institute of Biological Control of the Commonwealth Agricultural Bureau International, the International Organization for Biological Control, and the World Health Organization.
3. Development of aquaculture techniques in cooperation with the Southeast Asian Regional Center for Graduate Study and Research in Agriculture, the Federal Institutes of Food Sciences and Technology, and the Association of Southeast Asian Nations (~SE~N).
4. Development of improved rice varieties in cooperation with the International Rice Research Institute (IRRI).
5. Sponsorship of the International Buffalo Information Center in cooperation with the International Development Research Center.
6. Vegetable breeding, culture, and regional extension in cooperation with the Asian Vegetable Research and Development Center (AVRDC).
7. Cassava breeding, culture, and regional activities cooperation with the International Center for Tropical Agriculture (CIAT).
8. Potato tissue culture and rapid propagation techniques in cooperation with the International Potato Center (CIP).

4.4 Contributions to the International Scientific Body of Knowledge Through Journal Publication and Library Resources

Kasetsart University has an impressive list of regularly published journals for an institution of its size. These journals are circulated to international peer groups and libraries--sometimes in exchange for similar journals from Australia, Europe, the United States, Canada, and other Asian countries. In all, 22 journals and bulletins are issued, including the following:

1. The Thai National Agricultural Bibliography (issued bi-monthly)
2. The Buffalo Bulletin (an international journal of research on the water buffalo, issued quarterly)
3. The Kasetsart Journal (a journal of the social sciences, issued annually)
4. Kasetsart Research Reports (issued annually)
5. Thai Agriculture (issued monthly)
6. The Thai Journal of Forestry (issued three times a year).

The quality of the journals examined by the evaluation team was high. Some of the journals are written in English, and those written in Thai include abstracts in English. The Buffalo Journal is one example of an international English-language journal that demonstrates the high printing quality and scientific standards that Thai publications can achieve. Kasetsart University's publications are a major contribution not only to agriculture and animal sciences in Asia, but also to researchers interested in tropical agriculture throughout the world.

In addition, the Kasetsart University library maintains an extensive, up-to-date collection of international journals and periodicals for use by agricultural researchers, Government officials, and the public. The combined main library collection as of 1987 contained 102,742 books in English, 90,701 books in

Thai, 18,873 theses, 97 rolls of microfilm, and 19,833 microfiche. Finally, the separate faculty libraries have approximately 234,063 additional books and journals serving their respective disciplines.

4.5 Contributions to Regional Development and Understanding

The role of Kasetsart University as a catalyst, headquarters center, and meeting place for regional activities in agriculture has been a major contribution to regional development and understanding. The presence of international research organizations such as IRRI, CIAT, CIMMYT, CIP, and AVRDC on the Kasetsart main campus often brings international and regional scientists to meetings, workshops, and training programs in Thailand. A number of regional

and international meetings have been held at the university or elsewhere in Bangkok with university sponsorship. Examples of such Kasetsart participation are the following:

1. The ASAIHL Seminar on the Role of Universities in Rural Development in 1982
2. The Workshop on Improvement of Food Handling at Village and Household Levels in Asia, jointly sponsored by Chiangmai University, in 1983
3. The UNESCO Regional Seminar on Improvement of the Quality of Agricultural Education in 1987
4. The 9th National Seminar of Institutes of Higher Education in Agriculture in 1987
5. The ASEAM Food Conference on Food Science and Industrial Development in 1988

AVRDC's program with Kasetsart University is particularly illustrative of how the university's activities and cooperation with international entities can foster better regional understanding. Dr. Charles Yang, the regional representative of AVRDC, whose headquarters are on the Bangkhen campus, has built a strong program in vegetable production and research. Most of the field activities of AVRDC are at the Kamphaengsaen campus.

In addition to research, the Thailand Outreach Program of the AVRDC, in cooperation with Kasetsart University, conducts extensive 6-month training programs for participants from many countries in Asia, including the People's Republic of China. Chinese participation in the regional program has been facilitated by AVRDC's Thailand program, since direct contact with the People's Republic of China is impossible from AVRDC's main base of operations on Taiwan. Dr. Yang has visited China many times for AVRDC, and these contacts, plus the trainee programs, have resulted in scientific and cultural interactions between China and Thailand, thus promoting better regional understanding in a more relaxed political atmosphere.

5. IMPACT ANALYSIS: FACTORS THAT HAVE INFLUENCED THE DEVELOPMENT OF THE UNIVERSITY AND ITS IMPACT ON THE AGRICULTURAL SECTOR

Since Kasetsart University's founding in 1943, many factors have influenced the direction of change at the university and its impacts on agriculture and rural development in Thailand. Some of these factors have served to constrain the university's performance as an institution.

5.1 The Quality and Quantity of International Participant Training for Faculty Members

The large number of Thai faculty members who have been supported for M.S.- and Ph.D.-degree training at prestigious institutions around the world has given Kasetsart University one of the best trained and most highly qualified faculties in Asia. Many international donor agencies have contributed to this staff development, including the Rockefeller Foundation, the World Bank, the International Development Research Center, the Australian Government, and A.I.D. This combined effort has had a highly positive effect on the quality of teaching and research done at the university.

5.2 The Quality of the Kasetsart University Physical Plant and Facilities for Teaching and Research

Kasetsart University, again assisted by international donor contributions, has one of the most impressive collections of teaching and research facilities that the evaluation team has seen in the developing world. By the standards of many other universities evaluated in the worldwide A.I.D. study of agricultural universities, Kasetsart University has a splendid physical plant.

In addition, maintenance and upkeep of the facilities, funded largely by the Government of Thailand, are outstanding. Classroom buildings, laboratories, library facilities, and the university grounds are generally clean, well maintained, and functional.

5.3 The Location of Kasetsart's Main Campus in Bangkok

The location of Kasetsart's main campus in the suburbs of Bangkok has had a positive effect on university development. Because of the numerous services and amenities of a large cosmopolitan city, such as medical, educational, recreational, and other services, the university has been able to attract and retain high-caliber faculty, who might not be attracted to teaching and research positions if the university were more isolated from the capital.

5.4 University Openness and Attractiveness to International Agencies

Kasetsart University actively promotes an openness to international agencies and provides an attractive location for them. Its proximity to the international airport; the excellent hotels, superior housing and services, and the fine infrastructure of Bangkok; and the modern laboratories on the campus provide a distinct set of incentives for international agencies. Promotion of such international collaboration has been a positive factor for the university. The interaction of Kasetsart faculty and students with personnel of the international agencies broadens the participants' intellectual horizons and keeps them in contact with pertinent ongoing research worldwide.

5.5 Existence of a Strong System of Secondary Education in Thailand

The growth of the agricultural university system in Thailand in general--and of Kasetsart University in particular--has obviously been based on the development and expansion of Thailand's strong system of secondary education. The fact that Kasetsart University's enrollment in 1970 already exceeded its projected 1980 size is a direct consequence of national development efforts in secondary education. Although there are regional differences in the strength of this system, Thailand's secondary schools, both private and public, produce many well-qualified graduates for entry into the national university system.

6. ISSUES FOR THE FUTURE

6.1 The Need for Broader Representation in University Governance

Kasetsart University is administered by the University Council, which functions somewhat like a Board of Trustees in the U.S. system. However, membership on the council, as explained further in Appendix B, is heavily weighted in favor of the Kasetsart faculty, with little effective participation from outside the university. In effect, this means that the university faculty members on the council become both judge and jury of the university's ~and, hence, their own) past actions and future plans. The university needs to effectively avail itself of the broader perspectives and experiences of eminent persons from the outside community, which would help the university remain relevant to the needs of Thai society.

6.2 Excessive Rotation of Leadership Roles

At the central administrative levels, tenure is inordinately brief for all senior university office holders. The university rector's term is only 2 years--and the rector has the option of appointing new vice-rectors upon his or her election. The deans of faculty and heads of department serve only 4-year terms.

All these positions--with the exception of the vice-rectors--are elective positions. The rector is elected by universitywide vote, which includes all faculty members, university staff, and students voting on an equal basis. The deans of faculty and heads of department are elected by all faculty or department faculty and staff, respectively. Finally, the Ministry of University Affairs, which is nominally the supervisory government institution for the national university system, legally plays no role whatsoever in the approval or maintenance of any core administrative staff for any university.

In the evaluation team's view, the present administrative system may carry university autonomy too far. The root of the

problem appears to be a substantive disagreement over the practical application of the concept of academic freedom. Some argue that academic freedom requires the weakest possible system of university administration and, effectively, total freedom for the individual faculty member. Others argue that academic freedom with respect to the types and content of faculty/student activities is not incompatible with the university's need for a strong system of internal administration.

Resolving this ongoing debate in favor of weaker administration would lead directly to a disturbing lack of continuity in university planning and administration. This would leave Kasetsart University seriously vulnerable to criticism for its failure to establish long-term objectives and priorities. It would lead to a tendency to allow a collective drifting from one administration to the next, as each temporary administration focuses almost entirely on the exigencies of day-to-day university operations.

6.3 The Need for a Broader View of Kasetsart University As a Multipurpose Institution

There is clearly a prevailing perception among public agencies and private companies that Kasetsart University is primarily a teaching institution, with only a minor role in agricultural research and extension activities. Public funding for research clearly reflects this attitude. For example, of the baht 1.6 billion (approximately \$6.4 million at the current exchange rate) available annually for agricultural research from national sources through the National Research Council of Thailand (NRCT), the agricultural university system gets only about 2.5 or 3 percent; Kasetsart University gets less than baht 15 million (\$600,000) in tied Government of Thailand research financing and nothing in untied, discretionary research funds. This severe lack of research funding (\$815.00 a year per faculty member or \$3,600 per faculty member with a Ph.D.) makes meaningful research activity using public funding almost impossible.

Similarly, as described in Appendix G, the university has had little direct effect on the planning or implementation of agricultural extension efforts in rural Thailand.

6.4 The Need for More Research Planning and Priorities

The limited research and extension activities that do occur on campus appear to be poorly coordinated among faculty members. There is a need for more research planning and setting of research priorities by the Ministry of Agriculture and Cooperatives, the National Research Council of Thailand, the university rector or vice-rectors, the university's Research and Development Center, and even the deans and department heads. The Government of Thailand's Five-Year Economic and Social Plan apparently needs to have a more direct impact on university research priorities and on the

activities of individual faculty members.

6.5 The University Entry System and the Composition of the Student Body

Almost all Kasetsart University's students are selected through a national university entrance exam system that is significantly biased toward students from secondary schools in Bangkok, whose scores are generally higher than those of students from rural areas. The university itself has only a minor role in the selection of students through the national exam system, and there are few alternative entry systems. As a result of these deficiencies, almost half of Kasetsart University's students come from the Bangkok area and have had virtually no exposure to Thai agriculture. Although these students have little interest in agriculture, those with lower examination grades are often forced to enroll in an agriculture-related discipline, even though this is often their fourth, fifth, or even sixth choice of undergraduate programs.

Under this system, it is hardly surprising that many students come to Kasetsart University to study business administration, computer technology, engineering, electronics, and other nonagricultural subjects. Few Kasetsart graduates enter farming as a career, and many state that they have no intention of working in agriculturally related activities after graduation. These factors undoubtedly limit the university's ability to exercise a greater role in rural development.

6.6 Low Faculty Salaries and the Brain Drain Problem

Faculty salaries in the national university system are extremely low--about \$200 per month for an assistant professor with a Ph.D. degree. Because the cost of living in Bangkok is the highest in the country, the low salary means that Kasetsart faculty members who choose to remain in the university system must supplement their salaries with outside income through teaching at private universities and consulting with public and private agencies.

Finally, perhaps the most serious danger to the university's development, is the continuing brain drain of faculty. Although precise figures were not available for Kasetsart University, the faculty drop-out rate from this and other public universities was clearly a concern of interviewees at both the university and Ministry of University Affairs. Many of the faculty members are actively recruited by private firms in Thailand, which are said to offer salaries and other inducements equivalent to 5 to 10 times the value of those provided by the public university system.

If this situation continues, there will likely be an increasing tendency for university teaching to become a distinctly

secondary or tertiary source of personal income and professional satisfaction for the involved faculty member.

6.7 The Need for Stronger Incentives for High-Quality Research Work and Academic Advancement

Salary increases or other rewards for superior merit, outstanding research, or administrative competence need to be strengthened at Kasetsart University. Most salary increments are based on time served in a civil service grade, because all Kasetsart University faculty and staff are officially employees of the government and subject to civil service regulations for career and financial advancement.

6.8 Underutilization of the New Campus

Considerable funding since the early 1970s has gone to the development of Kasetsart University's Kamphaengsaen campus. The facilities and laboratories on this campus are superior to those of the main campus, and the new campus is located in an agricultural area with access to both on-campus field research plots and local farmers. In addition, new faculty housing and a special school for children of faculty members are available on the new campus. Yet, less than one-sixth of the total Kasetsart student body resides on the new campus at any one time and the percentage of facility usage by the faculty is even lower.

The university has encountered great difficulties in implementing the original plan to move faculty, particularly the more senior professors, to residences on the new campus (see Appendix B). At present, the likelihood of achieving greater use of these excellent facilities seems to be exceedingly tenuous.

7. LESSONS LEARNED

1. A fundamental reconceptualization of the concept and role of agricultural higher education is needed for enhancing the impact and relevance of agricultural universities and facilities.

Kasetsart is now viewed primarily as a teaching institution. In part, this teaching image reflects a Government mandate that deprives Kasetsart of any major research and extension roles, a condition which thereby constrains the university from achieving the kinds of impact it might otherwise attain if allowed to assume a more dynamic role in national development. If a university is to serve as a major source of socially useful knowledge, it can only generate such knowledge through the development and application of new concepts and methods to actual social and economic problems. This will require that the university engage in a full spectrum of

learning activities, running the gamut from basic to applied science, from thought to action, and from an emphasis on technology development to a greater interdisciplinary comprehension of the full range of institutional and policy factors that facilitate or impede social and economic change. In this context, much of the teaching and learning process needs to occur through a robust university research and extension program.

2. There is a need for strategic planning mechanisms within universities to integrate diverse faculties and disciplines around a common set of education and research priorities.

Kasetsart University has evolved into a large multipurpose institution with a multitude of departments and individualized faculty activities. In managing such a complex institutional structure, there is the risk that leaders will become preoccupied with addressing short-term, routine needs, neglecting thereby to devote sufficient attention to generating a strategic mission that can serve as a basis for a more unified research and education program. To address the latter need, institutional mechanisms need to be put in place that engage university leaders, faculty, and external constituencies in a constant process of strategic rethinking of the role and impact of the university as a major actor in national development.

3. New modes of university organization and structure are needed to allow faculty and students to engage in more problem-solving modes of active learning.

Most universities are structured around traditional, discipline-based departments. Thus, intellectual inquiry becomes differentiated and reduced within the narrow confines of discipline specialties. Yet, most rural development problems usually consist of complex and messy sets of interactions between technical, social, and institutional variables that transcend discipline boundaries. To address these more complex interactions, discipline-based departments need to be complemented by strong cross-cutting organizational forms that serve to mobilize faculty around major interdisciplinary problem areas.

4. The needs for university autonomy and accountability should coexist in a dynamic tension in order to ensure that university programs are responsive to a changing environment.

Some degree of university autonomy is required in

shielding the institution from unwarranted external interference. Nevertheless, too much autonomy will likely contribute to academic drift within the university. Thus, a dynamic balance between these two organizational imperatives needs to be carefully managed. It would appear, for example, that Kasetsart might benefit from having a wider representation of various external constituencies on its university council and in other university policy forums. In particular, the rapid growth of private agro-industrial enterprises in Thailand suggests that this sector should have a stronger voice in shaping the future direction of Kasetsart programs.

5. Strong institutional incentives are needed to support the emergence of visionary and entrepreneurial leaders who can introduce change and innovation within the university.

An effective university is responsive in addressing major social and economic needs within the surrounding environment. The ability to correctly identify such needs and to mobilize appropriate responses to resolve them ultimately depends on the emergence of innovative leadership from within the faculty and the outside community. The current incentive system at Kasetsart may serve to inhibit the growth of such leadership. There is little outside influence on university leadership recruitment and selection, and the short rotational periods for elected leadership may limit their capacity in supporting change and innovation.

6. The constant replenishment and nurturing of university faculty and administrators will need to be more effectively addressed by host governments and by external donor agencies in order to sustain education and research effectiveness.

The development of institutional mechanisms to encourage faculty development requires constant attention in order to sustain academic vitality and relevance. With many of the senior Ph.D. professors nearing retirement, Kasetsart University will face a formidable challenge in replacing these faculty. The pool of younger faculty with Ph.D. degrees is limited, and in general many of these faculty have not had the opportunity to study abroad for advanced degrees. This inbreeding, combined with a weak salary and promotion system and the lack of research funding for younger faculty, could set the stage for a qualitative decline in university performance.

7. External donors need to focus more attention on

developing and institutionalizing external linkages between universities and the various Policy, scientific. and industrial constituencies they are designed to serve.

Kasetsart has no formalized role in extension and receives little government support for its research efforts. As a consequence, its linkages to important support groups remain relatively tenuous. In too many instances, donor assistance has concentrated attention on building internal organizational capacity and neglected to link that capacity to the larger infrastructure of institutions serving the rural sector. Building these linkages will require a new kind of expatriate technical assistance that features less emphasis on the development of traditional technical assistance and more on the organizational process skills and systems perspectives required in building lines of communication and alliances at the interface between the university and outside constituencies.

APPENDIX A

METHODOLOGY

by J.H. Eriksen

The field research for this evaluation was conducted in Thailand from January 8 to 30, 1988. Given the complexity and relatively long history of Kasetsart University as an agricultural institution of higher learning and the time constraints imposed on the evaluation team, the team endeavoured to gather its primary information through a snowball sampling approach. Such an approach requires in-depth interviews to gather the desired information and to solicit suggestions from interviewees for additional contacts. This process rapidly broadens the field of respondents and maximizes variance in order to obtain as complete a response range as possible within the time allotted.

Initial interviews were conducted on Kasetsart University's main Bangkok campus. After obtaining an overview of the university's structure and operations from the university rector, the team split off to conduct one-on-one interviews on the main campus. To maximize respondent participation, the evaluation team avoided large group interviews whenever possible.

As interviews at the Bangkok campus continued, four members of the evaluation team spent one day visiting the university's satellite campus at Kamphaengsaen. On this campus, evaluation team members followed the same basic pattern in interviewing: following an initial presentation by the university vice-rector, interviews were conducted with individuals according to the team member's disciplinary interest.

During the second and third weeks in Thailand, team members concentrated on off-campus interviews with representatives from private sector agricultural firms, agricultural specialists attached to international research organizations and donor agencies, and Government officials from the Ministries of Agriculture and Cooperatives and University Affairs and from the National Research Council of Thailand. One evaluation team member traveled to northeastern Thailand for interviews at Khon Kaen University, and another visited Chiang Mai University and selected resource management project sites in the north.

Although the team considered using a written questionnaire to further increase the scope of responses from on-campus respondents, this activity proved unfeasible, given the constraints imposed by language, available reproduction facilities, and time.

The majority of the third week in Thailand was used to complete and review the main evaluation report. Specific appendixes

in the report are largely the product of individual team member's efforts. The final report was edited and completed in Ithaca, New York by the evaluation team leader, with additional assistance from team members.

APPENDIX B

UNIVERSITY MANAGEMENT AND INSTITUTIONAL DEVELOPMENT

by J.H. Eriksen

1. THE MISSION AND STRATEGIC ROLE OF KASETSART UNIVERSITY

The four primary functions of Kasetsart University and of the other state universities in Thailand are the following:

1. To implement high-level educational curricula in various technological and professional fields
2. To conduct research that is pertinent to the educational curricula being implemented and to the prevailing technical, economic, and social needs of the nation, and that contributes to the professional development of high-quality academic staff and to the university's reputation as a respected institution of higher learning
3. To render technological services to society and to promote the application of research findings among members of the various occupational groups of the country
4. To assist in preserving the national culture

A Kasetsart University document on the university's structure and functions states that "on the basis of the history of its development, it may be noted that in many aspects Kasetsart University fits well with the 'Land Grant' model of universities in The United States" (Kasetsart University 1987a, 2). Although it may be true that the traditional roles of U.S. land grant universities, namely, agricultural teaching, research, and extension, may be implied by the first three functions of the university that are listed above, Kasetsart University now seems to be viewed in Thailand as a general university whose primary orientation is teaching. It is no longer viewed by either faculty members or outsiders as exclusively an agricultural university.

In fact, there was a distinct tendency by interviewees the campus and within the Ministry of University Affairs to recast the strategic role of the university in wider terms: that of serving the needs of the entire Thai economy and society rather than that of maintaining its previous orientation toward the agricultural sector. Interviews among faculty members in agriculturally related disciplines appeared to show two trends. One was a generalized feeling of concern that the university had lost any unique sense of mission that it may have had vis-a-vis farmers and the agricultural sector because of the growing need farmers and the agricultural sector because of the growing need to share scarce resources with a number of nonagricultural faculties and enterprises within the

university. The second seemed to be a widely held perception that the future role of Kasetsart University in agricultural research and extension work would be increasingly limited to regional interventions in the central plain of Thailand, whereas the three new agricultural universities--Khon Kaen, Chiang Mai, and Prince of Songkla--would increasingly assume the predominant responsibilities for university-based agricultural interventions in the northeast, north, and south, respectively.

The administrative structure of Kasetsart University differs significantly from that of most U.S. land grant universities. In essence, Kasetsart has no internal institutional mechanism to provide for a core group of specialists in university administration or development planning who would serve on a continuous basis. The "administrators" at Kasetsart University are faculty members who have been elected to temporary posts or who have been appointed by an elected official as assistants during that official's term of office. University administrative roles are rotated in the short term between various groups of faculty members. Hence, it is very difficult for an outsider to determine whether any particular set of development objectives as presented by current administrators is reflective of a consensus in the faculty as a whole, much less of the views of the Government or the society at large.

The general feeling among evaluation team members after our interviews was that the university was devoting insufficient attention to long-term strategic planning. The university needs a well-defined, development plan that operates on the basis of a universitywide sense of mission for the university in Thai society.

Although many faculty members (and outsiders) did not hesitate to offer their opinions on what the university's mission in Thai society should be, and even on its responsibilities regarding the agricultural sector, these individual opinions were as varied as were the respondents themselves. To their credit, however, many respondents realized that the major achievements ascribed to the university, particularly in agricultural development, were the result largely of extraordinary efforts by individuals--or small groups of faculty members--working independently. Although the university was credited for providing a setting in which such individual efforts could be undertaken, no respondent attributed the discrete achievements to a strong university "sense of mission" in agriculture or to any welldefined set of university priorities in development.

The need for effective mechanisms for generating a larger institutional mission appears evident in the university's relationships with external agencies in Thailand. As discussed in the next section, the university's growing autonomy seems to have brought with it a set of institutional mechanisms that increasingly restrict, rather than broaden, on-campus appreciation of the university's role in society. The impression left is that Kasetsart

University is operating in self-imposed, self-contained isolation that increasingly reduces effective interaction with nonacademic elements of Thai society and limits constructive external feedback regarding university policy, development planning, or effective involvement in the agricultural sector.

An example of this phenomenon is the growing isolation between Kasetsart University and the Ministry of Agriculture and Cooperatives. Many faculty feel that the university has been excluded by the Government from many development activities to which they believe they could make a valuable contribution. There is a need for closer collaboration with the Ministry and with other regional universities.

2. ISSUES OF AUTONOMY AND ACCOUNTABILITY

2.1 The Organizational Structure of the University

Kasetsart University is a public educational institution under the tutelage of the Ministry of University Affairs. Academic, budgetary, and personnel matters of the university are under the nominal supervision of this Ministry but also require complex interactions with the Ministry of Finance, the university branch of the National Civil Service Commission, the Office of the Prime Minister, and other agencies, as shown in Figure B-1.

Figure B-2 shows Kasetsart's organizational structure. The Kasetsart University Council is the governing body empowered to formulate academic policies and to issue rules and regulations on university administrative matters. Including its chairperson, the University Council has 35 members, both ex officio and appointed. The ex officio members are the Secretary-General of the National Education Commission, the rector, vice-rectors, deans of faculty, and directors with faculty rank. The chairperson and a varying number of members (at least four but not more than nine) are appointed by the Crown on grounds of merit and on the recommendation of the Cabinet. The term of office for appointed council members is 2 years.

The rector is the university's chief executive, with the Kasetsart University Civil Service Subcommittee and the Council of Deans as executive boards. With the exception of the Graduate School, all faculties are subdivided into academic departments by field of study. The Graduate School functions primarily as the

Figure B1: The Structure of Thailand's National Higher Education System

Figure B2: The Structure of Kasetsart University

coordinating unit for the graduate study programs that are implemented through the various academic departments under its direct jurisdiction. Other units with faculty rank are similarly subdivided into divisions or sections based on their respective responsibilities.

Each faculty is headed by a dean, who also serves as chairperson of the executive board of the faculty. The heads of academic departments constitute ex officio members of the executive board of the corresponding faculty. Likewise, each of the other units with faculty rank is headed by a director who chairs an executive board of nine selected universitywide staff members. The Graduate School is headed by a dean, and a group of universitywide graduate staff members constitute its executive board, with the dean as chairperson.

Kasetsart University commands a very considerable degree of control over and flexibility in its operations. As a Government institution, however, it does have certain responsibilities to its supervisory ministry and, through it, to the central Government. But the sum of these responsibilities seems only to set the outer limits of the environment within which the university is free to function.

The majority of the university's annual funding for operations, capital expenditures, and research comes from the Government. Student fees are highly subsidized and contribute little to total university funding. The university, however, has authority from and is increasingly encouraged by the Government to mobilize and retain revenues from the operations of its various farms and research stations, from faculty consulting, from publications and product development, and from independent agreements with external donors and international research organizations. Although revenue-generating activities of this type have been of relatively minor importance in the past, there is a prevailing expectation on campus that their importance will grow in the medium term as the university comes under increasing pressure to counteract the budgetary shortfalls caused by declining availability of Government resources for the public universities.

2.2 The hiring and Advancement of Faculty Members

The university also has significant autonomy with respect to the appointment and promotion of faculty members up to the academic rank of associate professor. Faculty entry-level appointments are made by the university, subject to guidelines from the Ministry of University Affairs on the total number of faculty positions authorized for each university department and to civil service regulations governing university employees. Entry appointees serve a 6-month civil service probationary period after initial appointment. If this period is successfully completed, the new faculty member essentially receives lifetime university appointment

under civil service regulations, without ever having been subjected to any professional tenure-review process.

Two parallel tracks are open for faculty advancement. Financial and seniority advancement in the civil service is governed primarily by longevity and adherence to its regulations. Academic advancement from instructor through associate professor is through a process of blind peer review of a faculty member's professional achievements in teaching, publication, research, and other institutional service. This review is originated by the faculty member through voluntary submission of his or her promotion-request dossier. When the results of the review are positive, the dean of the appropriate faculty forwards a recommendation for promotion to the Ministry of University Affairs through the rector and the University Council. Since each promotion request that has reached this stage is accompanied by favorable recommendations from progressively higher levels of university administration, acceptance of the promotion recommendation at the Ministry level is generally a pro forma action.

The process of promotion to the rank of full professor also originates with the candidate, who voluntarily presents his or her promotion-request dossier directly to the Ministry of University Affairs. This dossier is then judged by Ministry-appointed reviewers, and any recommendation promotion is accepted or rejected at the ministry level. At this level, it is unclear what role, if any, the university plays in the promotion process.

2.3 The Administration of the University

The principal Kasetsart administrators--the rector, the deans of faculty, the directors of units with faculty rank, and the heads of department--are faculty members elected to their positions by their constituents. The election of the rector is universitywide, with all university employees and students eligible to participate. The rector serves a 2-year term. Other administrators are elected and generally serve 4-year terms. The vice-rectors are appointed by the elected rector and serve at his or her discretion.

The current election system for administrators at Kasetsart University has several interesting aspects. For example, although the university is a public institution that receives substantial Government funding, no agency outside the university can legally play a role in or influence the selection of candidates or the conduct of these elections. The relatively brief tenures of senior administrators and the lack of any provision for a permanent core of tenured full-time administrators may engender a condition of drift and loss of program continuity in periods when administrations are changing.

The final element of university administration is the University Council, which is the governing body of the university. The

membership of the Council is heavily skewed in favor of university representatives. According to current rules, a maximum of 10 of 35 Council members can be appointed by the Crown from outside the university. Appointed members serve only 2 year terms. Moreover, should the Crown appoint only the minimum number of outsiders, they could be outnumbered on the Council by as much as five or six to one.

The above mentioned conditions seem to call for new institutional mechanisms at Kasetsart University that will provide administrators and faculty members with maximum external feedback on societal dynamics and provide guidance to keep the university's programs relevant and energetic. In this era of dynamic transition in Thailand, training for students will need to be more oriented to the pragmatic needs of the private sector as the principal employer in the economy. Likewise, research activities will necessarily become more sophisticated and collaborative, with priorities constantly shifting in order to respond to local needs and constituencies.

3. INCENTIVES

One of the first major problems that surfaced and persisted during the evaluation teams interviews was that of declining career incentives for faculty members. Many respondents expressed a fear that Kasetsart faculties would encounter increasing difficulties in replacing present members with well-qualified candidates. As can be seen in Table B-1, approximately 25 percent of the faculty have Ph.D. degrees and 57 percent have master's degrees. Most of these professors received their professional training in external participant training programs financed by the Government and international agencies during the mid-1950s through the 1970s. Most of those external programs were no longer available in the 1980s, and this decline in opportunities for graduate study abroad has not been mitigated by the development of strong domestic graduate programs at the public universities. Kasetsart University's own graduate Ph.D. program is not of sufficient scope or quality to make a significant contribution to the need for replacement faculty; for example, there are only five Ph.D disciplinary programs and 55 Ph.D degree candidates at present.

Also, the faculty replacement pool is shrinking at the same time that the relative economic position of university professors in Thailand is changing. The emergence of a vibrant private

Table B-1: Kasetsart University Faculty by Degree Level as of
 July 1986

sector in the country has widened the gap in salaries and other incentives between existing faculty members and persons trained to equivalent levels and employed in private enterprises. In addition, the rising cost of living in the Bangkok area is increasingly forcing professors and their families in~ employment opportunities to supplement their family income.

This decline in the relative economic position of university faculty members has generated serious problems for Kasetsart University. It has raised the opportunity cost of university teaching as a career and made it much more difficult to attract qualified candidates to full-time teaching careers.

Several departments already face difficulties recruiting well-qualified replacements for their Ph.D. staff who are reaching the compulsory retirement age of 60 years old. Since many of the participant trainees in the 1970s were established university professors who were completing their Ph.D. and master's degrees in their late 30s and 40s, this replacement problem will be a large and difficult one for virtually all departments before the end of this century.

The initial conclusion on viewing the current academic rank structure of the faculty at Kasetsart University (see Table B-2) is that the majority of professors are new degree holders just embarking on their teaching careers. For example, whereas 25 percent of the faculty hold Ph.D. degrees and 57 percent hold master's degrees, fewer than 1 percent of existing faculty are full professors and fewer than 13 percent are associate professors. This conclusion, however, would be wrong. The age composition of Kasetsart faculty is probably little different than that found at most U.S. land grant universities, and the compulsory retirement age of Kasetsart faculty is 5 to 10 years young-

This phenomenon of an aging faculty in which 87 percent of professors still hold the academic rank of instructor or assistant professor is directly reflective of the lack of career incentives in the university system. Professors derive the majority of their financial rewards in the university system from their status as government civil servants. Advancement in this system is based almost exclusively on longevity and adherence to the system's employment regulations. Advancement in this system is not necessarily related to any academic attainments. The supplementary benefits of the civil service system are available to all professors by virtue of their tenured university positions and apparently do not change significantly with advancement in academic rank. Further, because of overlapping pay grades, there are only limited financial rewards for moving up in the academic rank system.

Table B-2: Kasetsart University Faculty by Academic Rank as of
 July 1986

Since new staff receive tenured university positions accorded to entrants after 6 months in the civil service system, there are essentially no incentives for academic achievements tied to tenure status. Although academic promotion does involve satisfying progressively more difficult series of academic requirements, our impression is that the appropriate candidate must also have attained a certain age to be seriously considered for higher academic rank. This would make it extremely difficult for any academic superstar to achieve rapid promotion in a system that has so many older professors with low academic rank.

Whereas promotion from instructor to assistant professor appears tied primarily to effective teaching performance, presentation of literature reviews and translations into Thai of articles and other materials published in foreign languages, and a generally acceptable performance of faculty responsibilities, promotion to higher ranks requires more evidence of original research and textbook publication. Because research funding is extremely limited at Kasetsart University and available funding is often allocated disproportionately to senior faculty, junior faculty have serious difficulty conducting the original research activities that could rapidly advance their careers. Junior faculty members also appear to carry heavier teaching loads and more student contact hours. Finally, they tend to be under greater financial pressures to provide for growing families.

4 . I S S U E S O F L E A D E R S H I P

There are many professors at Kasetsart University with superior educational backgrounds and extensive career experience. Many have demonstrated outstanding leadership skills in pursuit of their individual career objectives in teaching and research. However, there are few incentives that support strong institutional leadership. Since the university's present administrative system provides no long-term tenure, independent power base, or recognition for officials as administrators, long-term planning or radical reorientations in university policies may be minimized in favor of dealing with short-term, noncontentious matters in routine university management.

Since election to university leadership positions is competitive only within the confines of the existing faculty membership, there is the risk that leaders will give primary allegiance and attention to the constituency within the university that elected them. Thus, university leaders may be less inclined to open the university environment to innovative ideas from the outside or to cultivate extensive debates within the faculty aimed at improving the university's relevance to pressing development issues.

5. ADMISSIONS POLICY

Until the early 1960s, the public universities in Thailand were individually responsible for their admissions policies and procedures. Applicants had to have finished secondary schooling or the equivalent. Admissions tests were different for each subject and interviews were also required. The combined score from the admissions tests and the interviews was used to select entrants, with highly placed candidates given priority in the faculty to which they had applied, as limited by the number of places available in that faculty.

Usually, applicants applied to more than one university and more than one faculty. Good students would receive many acceptances. When these students made their choices, previously "filled" positions would be opened again. The universities would then have to fill the places not taken by the better students with second, third, or even lower ranking applicants. This process proved quite cumbersome.

To solve this problem, a combined higher education admissions test was instituted in the 1962/1963 academic year by the National Education Commission, working with the Combined Testing Committee, which is composed of representatives from various universities. Applicants were entitled to apply to six different faculties, ranked in order of preference, at the universities of their choice. Based on available space, those with the highest test scores were selected for the faculties or the major of their choice. Successful applicants then had to pass an interview and/or the written test of the admitting university. In the 1973/1974 academic year, admissions testing was transferred to the Ministry of University Affairs, which had been established in 1972.

There are now three ways to gain admission to a Government institution of higher education: by the combined admissions test, by institutional tests, and by direct admission. Eleven institutions use the combined admissions test as administered by the ministry: Chiang Mai University, Chulalongkorn University, Kasetsart University, Khon Kaen University, Mahidol University, Prince of Songkla University, Silpakorn University, Sri Nakharin-wirot University, Thammasat University, King Monkut's Institute of Technology, and Technical and Vocational Colleges/Bangkok Campus. The Ministry of University Affairs is responsible for the combined test. Institutions under this ministry admitted 14,762 new undergraduate students for academic year 1985/1986 from among 97,831 applicants. During that year, Kasetsart University received almost 16 percent of the successful combined test applicants (2,341 individuals) and had the third largest freshman class (after Chulalongkorn and Prince of Songkla Universities.)

To increase the educational opportunities for undergraduates

in the provinces, the universities of Chiang Mai, Prince of Songkla, and Khon Kaen instituted a special admission process for regional entrants in addition to the combined admissions procedure. In the 1985/1986 academic year, Chiang Mai University accepted the top 10 percent of secondary school graduates from each of the 16 northern provinces (1,278 students). Khon Kaen University selected the top 20 percent of secondary school graduates in the 16 northeastern provinces (811 students), without the requirement that these students sit for the combined test. Prince of Songkla University selected the top 30 percent of secondary school graduates from the 14 provinces in the south (911 students).

Besides provincial admissions by the three regional universities, some faculties, universities, and campuses have their own special undergraduate selection processes. The total number of students so admitted in the 1985/1986 academic year was 4,991 freshmen nationwide. Kasetsart University apparently participated in this special admissions process only to a very limited extent. Its freshman class of the 1985/1986 academic year totaled 2,384 students, or 43 more students than those admitted through the combined testing procedure.

At present, only two public universities in Thailand--Ramkhamhaeng and Sukhothaimatiraj Universities--are authorized to admit undergraduates without an admissions test. In the 1985/1986 academic year, these two universities admitted a total of 157,398 new students.

Entrance to graduate-degree programs at public universities in Thailand is still handled by the universities themselves, which have complete discretion in setting the requirements for such programs. In the past several years, admissions to Kasetsart University's various master's degree programs has varied between 555 and 648 students a year. Entrants to the university's limited Ph.D. programs has varied between 2 and 14 candidates.

The classification of the Kasetsart University student body over the 1982 to 1986 period by region in which the students completed their secondary education and by region of origin is shown in Appendix E, Tables E-1 and E-2, respectively. Approximately 66 percent of the student body in each year was composed of students who had completed their secondary education in the Bangkok area. Admissions of students who had completed their secondary education in one of the other six regions of the country were evenly divided, averaging between 4 and 8 percent from each region during the same period. Approximately 46 percent of all students came from the Bangkok area, while 20 percent had studied in Bangkok but came from other regions of the country. This migration of students to the Bangkok area for secondary education is quite common among more affluent Thai families and is an implicit recognition by university aspirants of the region-

al differences in secondary education.

6. EFFICIENCY ISSUES

According to a 1986 study by the Ministry of University Affairs, the dropout rate in public universities ranges from a low of 5.2 percent to a high of 22.8 percent (King Mongkut's Institute of Technology). Kasetsart University had the second highest dropout rate (18.5 percent).

Dropout rates by discipline (see Table B-3 indicate that agriculture has the third highest dropout rate in public universities nationwide, after science and medical technology. We did not obtain the precise figures by discipline for Kasetsart University.

The average number of years of actual study needed to complete an undergraduate degree is 4.46 years across all public universities. The average successful Kasetsart University freshman completes his or her undergraduate degree in 4.16 years (see Table B-4).

At the graduate level, professors and representatives of the Graduate School said that candidates for both master's and Ph.D. degrees often took longer than expected to finish their programs. Both programs are subject to a 5-year limitation, and candidates exceeding this time limit must apply to the Graduate School for permission to complete their programs. Although we saw no actual data on graduate candidates, the general consensus among interviewees--both professors and students--was that the average master's candidate finishes his or her degree in about 3 1/2 years. Ph.D. programs at Kasetsart University are so limited in scope and individualized to the candidate that figures to date are probably not representative.

We were not able to obtain a comprehensive picture across all faculties of faculty contact hours with students in classrooms, labs, and fieldwork. Our impression is that contact hours are so variable within and between faculties and departments that a single set of figures would not be of much value. Contact hours seemed to be highest among those faculty members who taught universitywide service courses for undergraduates and lowest among senior faculty in highly specialized fields. In interviews, junior faculty indicated that they tended to have a higher number of contact hours with students because of the nature of the courses they taught and their lesser involvement in research and off-campus consulting activities.

Table B-3: Efficiency Factors in Undergraduate Education, by Discipline

Table B-4: Efficiency Factors in Undergraduate Education by University or College

APPENDIX C

THE UNIVERSITY PROGRAM FOR UNDERGRADUATE EDUCATION

by J.L. Compton

The major objective of undergraduate education at Kasetsart University is to produce specialists in the various subject areas. Pursuit of particular educational interests outside the student's major area of study is usually limited to one or two elective courses per semester: four to five courses outside the major area of study are required for graduation. This pattern is somewhat relaxed during the fourth year, when students are allowed greater freedom of choice; elective courses are usually related to their evolving career ambitions. Of the 143-147 credit hours required for a bachelor's degree, roughly 120 hours are taken up by courses in the major field of study or other required courses.

Interdisciplinary courses or seminars aimed at broadening student perspectives or promoting understanding of global issues essentially are nonexistent at the undergraduate level. Students in the technical fields, by and large, do not take many courses in the social sciences or humanities, and vice versa. Several recent faculty meetings, with the encouragement of the rector, have focused on the prospects for an interdisciplinary corecourse foundation for all Kasetsart students. The Faculty of Social Sciences offers an interdisciplinary M.S. degree program in social development, but the primary clientele for this program are officers from the various Government departments (e.g., Community Development, Agricultural Extension) deputed specifically for this purpose.

Observations of courses in session and discussions with students and their instructors suggest that there is a considerable emphasis on the rote transfer of knowledge. It would appear that more opportunities are needed for students to develop their learning capacity through discussions and problem-analysis and problem-solving exercises. The weekly workload for students is five to seven courses (generally 15 to 21 semester credit hours), and these are mostly classroom lecture hours or laboratory sessions.

The library, which holds an impressive collection of books and journals in Thai, English, and other languages, appears to be heavily used by students doing course-related term papers or working on theses.

Verbal and written information from students, faculty, and employers in both the public and private sectors points to the need for greater practical training of students through fieldwork. Opportunities for fieldwork appear to be better at the

Khampaengsaen campus than at the main campus. Some Kasetsart student organizations have been active in carrying out volunteer rural development work during the April-May break. But such activities are short term (20 days) and usually involve only several hundred students out of the 8,000 undergraduate student body. The focus of these volunteer programs has recently shifted from the construction of rural village schools to educational instruction for village adults, youth, and children in agriculture and health topics.

There was no evidence of any major formal assessments of the quality and effectiveness of the undergraduate education program. Data from annual surveys of the employment status of B.A./B.S. graduates do not provide much insight into the quality or relevance of the undergraduate experience. The university has no formal requirement for instructors to administer student evaluation forms for their course or the instructor. The Department of Agricultural Economics is apparently the only one in the university with a uniform, departmentwide policy of administering student evaluation forms at the end of every course.

APPENDIX D

THE UNIVERSITY PROGRAM FOR GRADUATE EDUCATION

by H. David Thurston

Although Kasetsart University was founded in 1943, its Graduate School was not established until 1967. The Graduate School serves as an administrative unit for the coordination and supervision of all graduate study programs in the university. At present, there are 52 major fields of instruction leading to master's degrees. In addition, Kasetsart University offers Ph.D. programs in entomology, plant pathology, soil science, agronomy, and horticulture. There are plans to expand the Ph.D. programs to other fields in the near future, including agricultural economics and food technology.

Student enrollment in the graduate school in 1986 included 40 doctoral degree candidates and 2,163 master's degree candidates. Enrollment rose in 1987 to 55 doctoral degree candidates (6 in entomology, 5 in plant pathology, 32 in soil science, 10 in agronomy, and 2 in horticulture) and 2,236 master's candidates universitywide.

The curricula for advanced degrees at Kasetsart University emphasize a balance between coursework and thesis research. Generally, a master's degree program requires 36 semester credits (24 to 27 credits for major subjects and 9 to 12 for minor subjects) and an additional 9 credits for a thesis. A Ph.D. program requires at least 24 additional credits of coursework, which consists of a minimum of 12 credits for major subjects and 9 credits for minor subjects. An additional 16 credits are required for dissertation research. The study programs are set by the student's graduate advisory committee but must be approved by the department head and the Graduate School. Master's degree candidates have to complete their degree requirements within 5 years. Ph.D. degree candidates have a residential requirement of no less than four semesters but no longer than 5 academic years. Graduate faculty normally can advise only five candidates at one time but may petition to take as many as eight in certain fields.

Judgments on the quality, relevance, and appropriateness of Kasetsart University's graduate program to Thai agriculture are difficult to make for several reasons. First, demand for graduates in the public sector has declined while demand in the private sector has increased in recent years. In the past, 75 percent of Kasetsart graduates went into public sector employment. Currently, some disciplines cannot supply the economy with enough graduates, whereas in a few disciplines graduates cannot find jobs. For example, there is great demand for graduates with training in computer science, electronics, engineering, tissue

culture, and business administration. Some of these areas may not be directly related to Thai agriculture, but they do contribute to the development and prosperity of the nation as a whole.

Judgments on the quality of the graduate program are necessarily subjective. We generally found that students' perceptions of their courses, professors, and training were positive. Graduates in both the private and public sectors felt that they had received a "good" education. Kasetsart graduates are in demand in most fields and appear to be highly regarded by employers. Many graduate students are already employed, and some are hired even before they graduate. For example, at the time of our interviews, 80 percent of the graduate students in the resource management program already had jobs.

Kasetsart University was the only agricultural university in Thailand until the establishment of three regional agricultural universities about 20 years ago. About 80 percent of the faculty at these three universities (Khon Kaen University in northeastern Thailand, Chiang Mai University in the north, and Prince of Songkla University in the south) are Kasetsart graduates. In recent years, despite its rapid population increase, Thailand has continued to export food and has seen a rapid growth of agriculturally related private sector enterprises. Kasetsart University and its faculty deserve significant credit for supporting these national accomplishments.

The evaluation team found several problems related to the structure of the Graduate School. Since many graduate students are employed, they tend to take an inordinate amount of time to finish their degrees. Often, after finishing their coursework, they have to return to work to survive financially; thus the completion of their theses is severely delayed. Students take an average of 3 1/2 years to complete a master's degree and often take longer than 5 years to finish their Ph.D. degree. Frequently, they must petition the Graduate School for additional time beyond the 5-year limit. Also, since advisers are normally allowed only five graduate students at any one time, the talents of the best of the graduate faculty are often not fully used in graduate training because of the late-finishing students. There is a need in this context to use the talents of the personnel of the Department of Agriculture or the Department of Agricultural Extension of the Ministry of Agriculture and Cooperatives to further enrich the university's graduate seminar program.

Almost all university administrators and faculty felt that in future decades Kasetsart University will face a severe problem maintaining the quality of its faculty as faculty who received training abroad under various graduate-level participant training programs begin to retire. Few scholarships for Ph.D. training are currently available, and the numbers receiving Ph.D.s at Kasetsart University are far too low to meet even the

university's internal demand for replacing faculty members who retire. Thus, faculty positions will be filled by graduates with a master's degree, who will not have the facility in English, knowledge of world scientific literature, and the broad, demanding training generally received by those who receive Ph.D. training abroad. Possible solutions for this problem might include Ph.D. programs in which Thai students would do their coursework abroad and their dissertation research in Thailand. More exchange of professors internationally would also help. For example, U.S. professors might spend their sabbatical at Kasetsart University, doing research, teaching, or extension work, and Kasetsart professors (especially those with graduate degrees from Kasetsart University) COULD similarly spend their sabbatical in U.S. institutions.

APPENDIX E

AN ANALYSIS OF UNIVERSITY GRADUATES AND THEIR POST-TRAINING ACTIVITIES

J.H. Eriksen

Kasetsart University has begun to conduct tracer studies of its undergraduates' successes and failures in the job markets of Thailand. Tables E-1 through E-6 summarize the essential findings of two tracer studies conducted in 1985 and 1986.

Table E-1: Classification of Kasetsart University Undergraduate Students by Region in Which Secondary Education Was Completed, 1982-1986 (percentages)

Region	1982	1983	1984	1985	1986
Bangkok	67.5	65.3	67.3	66.2	64.1
Central	5.2	6.1	4.8	8.6	6.7
North	7.2	6.1	5.1	5.5	5.8
Northeast	4.5	5.9	6.1	6.2	6.0
East	4.1	4.7	4.8	4.6	3.9
West	6.1	6.8	6.9	7.0	8.1
South	5.4	5.0	4.6	4.8	5.1

Table E-2: Classification of Entering Kasetsart University Undergraduate Students by Region of Origin, 1982-1986 (percentages)

Table E-3: Results of First Kasetsart University Student Tracer Study as of July 17, 1985

Table E-4: Result of Second Kasetsart University Student Tracer Study, as of February 28, 1986

Table E-5: Region of Employment for Kasetsart University
Students as of Second Traver Study, February 28,
1986 (percentages)

Table E-6: Type of Employment of Kasetsart University
Students as of Second Tracer Study, February 28,
1986 (percentages)

APPENDIX F

AN ANALYSIS OF THE EFFECTS OF UNIVERSITY ACTIVITIES ON CHANGES IN LIVESTOCK PRODUCTION IN THAILAND

by N.M. Konnerup

1. INTRODUCTION

The Department of Animal Science of the Faculty of Agriculture and the Faculty of Veterinary Medicine developed rather late in the formation of Kasetsart University. During the tenure of the Oregon State University contract through 1960, no teaching and research assistance was provided despite recommendations by Oregon State University staff and direct requests to the U.S. Agency for International Development (A.I.D.)--and its predecessor agencies--by Kasetsart University faculty. However, under the University of Hawaii contract of 1962 to 1965, the Department of Animal Science and the Faculty of Veterinary Medicine did receive some stimulating influence from University of Hawaii faculty in animal science and veterinary medicine.

Despite the lack of strong support from A.I.D., Kasetsart University managed to maintain a teaching role in animal science and veterinary medicine and succeeded in sending a number of undergraduates to the United States and other countries for advanced training. During the 1960s, other donors, including the Rockefeller Foundation, kindled a keen interest in a broad range of livestock improvements in Thailand. In fact, the Rockefeller Foundation instigated the improvement of livestock breeding, feeding, and health practices that began in Thailand, such as the introduction of improved animal genetic material to the indigenous poultry and swine stock. With the improvement of instruction at the university and the cooperation of the extension services in disseminating this knowledge to the rural areas, the modern poultry and swine industries in Thailand were born. The success of these industries in the rural areas subsequently led to the intensive commercial production systems that now characterize Thailand's poultry and swine industries.

As a result of this growth, large-scale feed-milling firms that use mainly indigenous crop materials have developed, and the private sector is regularly absorbing graduates and postgraduates in the animal sciences. In addition, Kasetsart animal science graduates are being recruited to expand the educational program various divisions and at the regional universities and within the agencies of the Ministry of Agriculture and Cooperatives.

The expanding dairy industry, stimulated by increasing demand for milk and milk products, is also being serviced by the growing animal feed industry, which requires further inputs from graduates in animal sciences.

Kasetsart University, and the regional universities that have benefitted from recruiting Kasetsart animal science graduates, face formidable challenges in the development of animal breeding, nutrition, and health technologies to meet the requirements of expanding animal production. Also the animal science faculties must perform a critical evaluation of indigenous feeds and forages because production of these materials in tropical environments is far more complex than in temperate climates.

2. DAIRY DEVELOPMENT

Intensive dairy operations that use imported European breeds and modern processing and marketing systems are resulting in increased milk consumption in the larger cities. However, the sophisticated support systems needed for this type of dairy development are not appropriate to Thailand's rural areas. Kasetsart University will need to promote innovative studies of these rural areas to ensure the development of animals that can produce reasonably efficiently, to sustain yields by using locally available forages and crop residues, and to withstand the stresses of disease and a harsh environment.

3. THE BEEF INDUSTRY

Thailand has for many years exploited the water buffalo as a draft animal. The use of the buffalo as a meat animal developed as the Thai population increased and tractors replaced the buffalo in cultivation. However, because of various factors, both the size and productivity of the buffalo was decreased. Efforts are currently underway through the International Buffalo Information Center at Kasetsart University and in the northeast to improve the water buffalo as a draft and meat animal through genetic improvement and selective breeding. Nutrition studies are also underway under the direction of Kasetsart's Department of Animal Science.

Kasetsart University and the Ministry of Agriculture and Cooperatives have recently become involved with commercial ranches by introducing Brahman bloodlines to crossbreed with native cattle to boost productivity. Modern technology, including artificial insemination and embryo transfer, are being explored as possible tools in future livestock development.

4. POULTRY PRODUCTION

An explosive increase in the size of the poultry industry in Thailand resulted from the importation of high-quality genetic material, sponsored by the Rockefeller Foundation advisory services with Kasetsart University. This development was complemented by the establishment of the feed industry, based largely on the use of feed components produced within the country. Poultry production in Thailand is currently a vertically inte-

grated, highly sophisticated industry.

Poultry production is increasing rapidly as a result of significant export demand and changing domestic consumption patterns. Also, the industry is regularly absorbing Kasetsart and other university graduates in animal sciences and veterinary medicine, and this technical and scientific resource pool is making a major contribution to the continuing development of the poultry industry.

The demand for poultry has also had a spillover effect in the development of small- and medium-scale poultry enterprises. The expansion of chicken- and duck-raising enterprises associated with swine and aquaculture production benefits small- and medium-scale producers.

5. AQUACULTURE

Fish culture, in conjunction with swine and poultry enterprises, is developing rapidly in Thailand. However, with marine fish catches rapidly overreaching sustainable yields, there is much concern for improving brackish-water fish and prawn production and increasing the size and efficiency of aquaculture in ponds and reservoirs. Furthermore, the Department of Fisheries is critically concerned with the adverse effects of water pollution and dam encroachment on fishery resources. Also, studies are being carried out on culture of adaptive species; fish breeding, including the use of hormones; and organized distribution of fish fry and fingerlings to further develop the aquaculture industry.

6. ISSUES OF CONCERN

Kasetsart University's basic training in animal science and veterinary medicine at the undergraduate level is still located on the Bangkhen campus. However, the practical and clinical programs at the farm level are located on the Kamphaengsaen campus, which means that these components of the curricula are in effect divorced from the basic theory presentations.

Graduates in both animal science and veterinary medicine are increasingly being recruited by private industry, which is intrinsically beneficial to national livestock production. Furthermore, since the budgetary constraints on the Government limit the growth of employment opportunities in the public sector, the increased private sector recruitment provides employment opportunities for an increasing number of graduates. However, this tendency has also resulted in a certain level of neglect of the small livestock operators in the more remote rural areas.

Another concern is an apparent inertia in exploring alternative sources of nutrients and forages for livestock development outside the vertically integrated industries. Aside from a small

amount of research initiated by the International Buffalo Information Center, there appears to be little investigation of pasture improvement or preservation of forage or use of crop residues.

APPENDIX G

AN ANALYSIS OF UNIVERSITY IMPACTS ON INFORMATIONAL TRANSFERS TO THE RURAL POPULATION IN THAILAND

by J.L. Compton

Kasetsart University is primarily a teaching institution. Its secondary role is research. Of much lesser importance has been its role in extension and training. There is no discernible impact of the university on extension models and strategies currently employed by the National Department of Agricultural Extension, other Government agencies concerned with rural development, or nongovernment organizations that have extension programs.

The university's own extension activities consist of the following:

1. Agricultural programs broadcast through radio stations
2. The production of agriculturally related video tapes, which are sometimes used by local television stations and by other educational institutions
3. The production of prototype pamphlets and brochures on agricultural subjects, which are available by request to other organizations
4. Annual farmer training days, which are held at the university for a few hundred farmers
5. The operation of a National Center for Extension and Training at Khampaengsaen campus, where 85 percent of the training is conducted by outside organizations and agencies (these organizations are charged a fee for the use of the facilities)
6. The natural extension effects of certain field-based research projects
7. The extension activities carried out through the summer rural development camps of Kasetsart's student organizations

However, certain individual faculty members, in the course of pursuing their field research and development projects in such topics as rural participation, communal irrigation, and fisheries, have undoubtedly also performed an extension function. One professor, for example, is well known throughout the country for his weekly newspaper column on agriculture and his frequent organization of study tours for farmers.

The heroic efforts of individuals and small groups aside, the point remains that the university, with its limited mandate and resources for extension work and its lack of any formal links to other organizations or agencies that have such a mandate and resources, cannot be expected to play a major role in agricultural extension in the country.

The history of agricultural extension in Thailand may be divided into three periods: (1) the pre-1977 period before the "training and visit" program (sponsored by the World Bank after 1977); (2) the 1978-1985 period, which saw a major expansion from 3,000 to 8,000 extension personnel in the country; and (3) the period from 1985 to the present during which there appears to be an evolving small-farmer focused, agroecological perspective on farming systems, farmer organizations, and farmer participation, as well as a greater concern for effective services for larger commercial farming operations. These dual systems, the former administered through the National Department of Agricultural Extension and the latter through private agribusiness entities, are both necessary and mutually complementary.

During the pre-1977 period, Kasetsart University's applied research studies on the nature of extension work and farmer adoption were its major contribution to extension work. Some contributions were also made through the university's radio stations and infrequent training programs for small groups of farmers. In 1978, with a \$40 million loan from the World Bank, Thailand greatly increased the number of generalist extension-agent positions on the subdistrict level throughout the country and assigned additional supervisory and specialist personnel to support them.

During the 1978-1985 period, the Department of Agricultural Extension attempted to establish functional linkages with the university in the areas of research, continuing degree-related education for staff, and short training courses for staff development. However, there was not much success in establishing linkages for research or training. The expansion of the continuing education program for B.S. and M.S. degrees for Department of Agricultural Extension staff was based on funds available through the World Bank loan.

Three years ago, with completion of the World Bank program, Thai authorities chose to try several new ideas and approaches to extension work. This new set of initiatives seems to emphasize the formation of a nationwide association and network of extension scholars and leaders, especially those at the regional agricultural universities, and the promotion of agricultural knowledge and organizational systems research (in contrast to the outworn farmer-adoption research). Kasetsart University's future in relation to these developments is probably contingent on the faculty becoming more involved with the realities of actual

extension work in the country.

APPENDIX H

THE FACULTY OF FORESTRY

1. INTRODUCTION

What is now the Faculty of Forestry at Kasetsart University had its start as a 2-year program (independent of the university) at Phrae in northern Thailand. This school had been opened by the Ministry of Agriculture in 1936 to develop locally trained people for the Royal Forest Department. In 1940, training offered by the school was expanded to 3 years, culminating with an Associate in Forestry degree.

When Kasetsart University was created in 1943, it incorporated the school as its Faculty of Forestry. The faculty initially offered a 5-year curriculum, but that was suspended after 2 years due to lack of lecturers and facilities. The 3-year associate program was reestablished.

In 1954, the Faculty of Forestry moved to the university's main campus in Bangkok, and a 5-year curriculum was again introduced to coordinate with other faculties' curricula. In 1969, the course of study leading to the B.S. degree was modified and reduced to 4 years. Two years before that, in 1967, the university's first graduate training (in silviculture) was offered.

The present 4-year curriculum follows traditional academic lines. The first 2 years consist of training in the basic sciences and general forestry for all students. Other faculties of the university provide some of this basic training. In the third year, students begin to specialize in one of three areas: forest resources management, forest products, or social forestry. Choices are made primarily from the course offerings of the faculty's six departments.

At the graduate level, study in any one of five major fields (forest biology, silviculture, watershed management, forest management, or forest products) leads to the M.S. degree. All graduate and undergraduate instruction is conducted in Thai.

2. THE CONTEXT

The significant feature of the Faculty of Forestry is that it is--and has always been--the only academic forestry school in Thailand. Thus, it has been the wellspring for forestry and natural resources manpower development on which the Royal Forest Department, the Forest Industries Organization, and related Government department and organizations have traditionally depended for professionally trained personnel.

Massive decreases in the supply and condition of Thailand's

forest resources during recent decades have profoundly affected the ways in which forest-management responsibilities have come to be viewed by the faculty and others. Since 1960, three distinct stages mark the development of present efforts by the faculty, the larger academic community, the Government, and the private sector to protect Thailand's forests.

Until about 1960, the Thai considered their forests to be almost an unlimited resource. The Government viewed timber production as a central objective, and the job of forest management was primarily to oversee orderly timber exploitation as a source of national income. Forest-protection activities were directed primarily at halting illegal extractions by commercial entities. Harvesting of forests by villagers in need of firewood looked as negligibly depleting forest resources and as an accepted part of Thai culture. As Niwat Ruangpanit (1987) states, "Forestry education in this period emphasized the productive role of forests. Managers concentrated on earning revenues without any conservation measures" (p. 5).

Between 1960 and 1985, came an increasing awareness of the many purposes forests serve in protecting the environment and of the need to manage this resource to achieve multiple objectives. Thus, range management, wildlife management, watershed management, and concern for the environment became an integral part of the faculty's curriculum. Meanwhile, the clearing of land for agricultural use rose in response to increasing population pressures, with the resultant scarcity of wood and other forest derived products in various localities raising even more questions about the need for forest conservation and sustainable production. Evidence of declining environmental quality directed attention to the indirect, protective role forests serve.

Since the mid-1980s, forestry in Thailand appears to have entered a third major stage, precipitated by the rapid disappearance of the forests. In 25 years, Thailand's forest area declined by almost 50 percent. The price of timber rose so more and more land was converted to agriculture. Time-honored management methods were shrugged off by a rising tide of hungry, landless people who had derived their livelihood from the forest by exhausting this resource and then moving on. It became increasingly apparent that the so-called forest-management problem no longer involved simply managing forests but managing people as well. Furthermore, the problem had become so big that the institutions responsible for forest management, such as the Royal Forest Department, could no longer handle the job alone.

As a result of mounting pressures, forestry programs have been extended far beyond traditional lines. Fields such as anthropology, sociology, environmental science, economics, and the managerial sciences are being called on to help address newly

recognized socioeconomic and environmental concerns arising in forest management efforts. The academic community has become increasingly involved: 8 of 14 Government-run universities now offer course work in natural resource and environmental areas. The Government, unable to rally sufficient resources to deal with the problem of uncontrolled forest conversion and degradation, is seeking private sector involvement and considering how to reorganize its efforts to address these newly emerging issues in forest conservation. It is within this context that the Forestry Faculty of Kasetsart University is seeking to redefine its mission.

3. STAFF

The Faculty of Forestry staff currently numbers 67, distributed within six departments and the administration (Administration, 4; Forest Management, 13; Forest Biology, 10; Forest Products, 11; Silviculture, 11; Forest Engineering, 7; Conservation, 11). Its members are generally well educated: 37 have a Ph.D., D.F., or D.R.M. degree, and another 27 have an M.S. or M.F. degree. Of those 67 staff members, 37 were trained in the United States at 13 different universities.

The faculty view their primary obligation to be the teaching of students and thus generally heavy teaching load. Time spent on research and other professional activities varies widely among individuals. Low salaries engender off-campus activity and an emphasis on potential earnings as opposed to subject matter in some of the research undertaken. Nevertheless, the staff points easily to several significant research and public service contributions it has made.

4. RESEARCH CONTRIBUTIONS

At least three recent staff research contributions are held to be socially significant. One is the development of a National Parks and Wildlife Sanctuary Master Plan, which is being carried out by faculty and selected graduate students at the request of the Government.

Two other contributions are watershed oriented. One is the watershed classification scheme, which the Government has recently adopted and which provides a general guideline for managing watersheds nationwide. The other research contribution is remote sensing for watershed delineation. It helps to meet the pressing need to establish watershed boundaries, particularly in the northern areas of Thailand.

5. PUBLIC SERVICE

The faculty view their prime contributions in recent years as "growing with the times." One of the activities they point to with pride is the broadening of the curriculum to include training in watershed management, environmental science, social forestry, wildlife ecology, and other currently highly relevant topics.

Staff members also believe that Government decision-makers consider them to be an unbiased source of information on forestry affairs. The appointment of the Dean of the Faculty of Forestry to the Government's Committee on National Forest Policy exemplifies this confidence.

The faculty also view themselves as gaining international recognition. In "Highlights of International Aid to Forestry Development in Thailand," Rao (n.d.) identifies 16 international agencies and bilateral donors who are actively assisting the Government in strengthening its forestry sector. Some have sought close collaboration with Kasetsart University. In July 1987, for example, the Asian Development Bank established a Regional Training Center in Community Forestry in Thailand on the Kasetsart University Campus in Bangkok. The center provides training for mid-level personnel from forestry programs in other Asian countries and will serve as an information clearinghouse on the subject.

The A.I.D.-funded Forestry and Fuelwood Research and Development project also has a regional office on the campus and collaborates in Faculty of Forestry research through a memorandum of understanding with the university.

Kasetsart University's natural-resource-oriented activities are also supported through the Food and Agriculture Organization's Regional Office funds for research and campus development, Ford Foundation grants, Finnish postgraduate fellowships, Japanese fellowships and funding for campus development, and Swedish support of the pioneering curriculum for social forestry education within the Faculty of Forestry.

At the national level, an impressive series of well-attended seminars have gained public attention. Since 1980, on National Wildlife Day (December 26), the Faculty of Forestry has organized the National Seminar on Wildlife of Thailand to promote research and public awareness. Attendance totals 200-300 participants, comprising representatives from the Royal Forest Department, other universities, researchers, journalists, and the private sector. Other occasional seminars have focused on fast-growing tree species, bamboo, rattan, and watershed classification.

The faculty also remain in the public eye through newspaper articles and public announcements on current issues. Their professional journal, Thai Journal of Forestry, is published

three times a year and has gained an international readership.

6. STUDENTS

When the school that was the precursor to the Faculty of Forestry first opened in 1936, it had 25 students, 17 of whom were from the Royal Forest Department. Since then, the Faculty has graduated over 2,500 students. In 1986, enrollment totaled 850, including 250 graduate students. Each class comprises approximately 140 male and 30 female undergraduates and 60 graduate students.

Student job opportunities have been declining in recent years. Available statistics show that in 1986 a total of 130 students, of whom 24 were women, graduated with degrees in forestry; 96 of these graduates found jobs. Of a sample of 65 of the graduates who had been employed, 48 went to work for the Royal Forestry Department, another 15 went into the private sector, and 2 found employment at the university. The statistics also show that many (over 40 percent) of these jobs were temporary, and descriptions of the types of work performed strongly suggest that much of it is subprofessional.

7. RESOURCES

Library and laboratory resources within the Faculty of Forestry are well maintained but dated. Much of the large library collection appears to be more than 20 years old, and newer texts are lacking. English-language literature receives limited use, in part because students are taught in Thai. Faculty translations of relevant English texts and articles sometimes are prepared for use in training, but students find such translations to be scarce and expensive. Although faculty offices contained more recent publications, these generally were not widely distributed.

Laboratory equipment is also dated and not adapted to the demonstration or teaching of advanced forestry techniques. The university's limited budget has not provided sufficient means for upgrading and strengthening laboratory facilities.

8. ASSESSMENT

The Faculty of Forestry is hard pressed to maintain relevancy and technical leadership in a world of rapid change. The traditional job market for its students as natural forest managers for the Government is eroding and changing. National needs in forestry are shifting from natural forest to plantation establishment and management; from emphasis on technical/biological issues to socioeconomic and environmental issues; from exclusive dependence on the Government for forest management to a shared dependence with the private sector.

Agencies like the Royal Forest Department and the Forest Industries Organization, trying to adjust to these pressures for change, are taking on new roles and responsibilities and see the need to retrain their personnel in new areas such as economics and environmental management.

The national call to broaden forestry education to include allied fields, and to increase private sector involvement, has encouraged several other public universities to develop forestry training programs in areas such as agroforestry, environmental studies, and wildlife management. Thus, as forestry broadens its scope, the field will become more competitive for educators, while offering increasing opportunities in the private sector for trained professionals.

Kasetsart's Faculty of Forestry has been changing with the times by broadening its curriculum offerings and responding to outside requests for support in areas of individual staff competence. Although the faculty has already made significant contributions to forestry management, larger issues are still to be addressed that offer the faculty tremendous opportunity for future growth and change. Among them are the following:

- How the faculty can most effectively combine its capabilities and program with those of other institutions that have related interests but that are geographically scattered and differently endowed with trained professionals and resources
- How it can adapt to serve the retraining needs of Government agencies that are trying to restructure themselves to address a newly emerging set of national needs
- How it can predict the emerging role of the private sector and prepare its students to meet intensifying sectoral demands for innovative and independent thinking under limited supervision
- How it can contribute most reformulation of national resource conservation policy and assume leadership in advising and guiding implementing institutions

In brief, the crucial emerging need in Thailand's forestry management is for a faculty that collectively understands its longer term professional responsibility and can develop and implement a comprehensive plan for achieving it. Discussion, debate, innovative thinking, and compromise will be needed to achieve this goal--and the payoffs can be immense.

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